VAN WATERS & RODGERS
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REFERENCES TO THE REPORT

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Ref #2

Harding Lawson Associates

A Report Prepared For:

Van Waters and Rogers, Inc.
1600 Norton Building
Seattle, Washington 98104

Dallas
31-C-4

SITE CHARACTERIZATION REPORT
VW&R DALLAS ALPHA ROAD FACILITY
FARMERS BRANCH, TEXAS

HLA JOB NO. 09695,091.15

by

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Senior Hydrogeologist

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Associate Engineer

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April 1989

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DEFINITIONS

The following terms are defined as:

ALLUVIAL
refers to being carried and/or deposited by running water (streams), such as fairly recent deposits of sediments; gravels, sands, silts, and clays.

CHALK
is a type of limestone which is a consolidated sediment (rock) composed of calcium carbonate ($CaCO_3$), which is chemically precipitated. Chalk is specifically composed of the shells (organic precipitate) of floating and bottom dwelling microorganisms. It is a soft rock and is usually white to gray in color.

CLAY
is an unconsolidated sediment of soft plastic consistency composed of very fine-grained (very small particle size) minerals. A silty clay is a clay that contains some minerals of a slightly larger grain size.

DETECTION LIMIT
is the lowest concentration of a chemical compound in a given media (such as soil, water or air) that can be readily quantified (identified) when utilizing a specific current state-of-the-art Environmental Protection Agency (EPA) approved analytical methodology.

FAULT
is a structural feature of a rock resulting from the brittle behavior of the rock. A fault is a fracture (crack) that has formed in the rock. The fracture is accompanied by the displacement (usually downward) of the rock on one side of the fracture relative to the rock on the other side of the fracture. The block of rock that is displaced is in a direction parallel to the fracture. A FAULT PLANE is the relatively flat surface of the fracture upon which displacement of the rock occurs. Types of faults encountered below the site:

DEFINITIONS
(continued)

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1) GRABEN
is a physiographic depression (trough) in the surface of a rock. This is caused by a block of the rock being displaced downward (downthrown or downfaulted) because it is bounded on two sides by high-angle (near vertical) faults, i.e., a block of rock between two faults has been displaced downward relative to the rock on the other sides of the two faults.

2) HORST
is a block of rock that is topographically higher than the surrounding rock because:

a) the block of rock has been displaced upward (upthrown or upfaulted) between two high angle (near vertical) faults, i.e., a block of rock between two faults has been displaced upward relative to the rocks on the other side of the faults, or

b) the block of rock has remained stationary and the rocks on the other side of the faults (bounding the block of rock) have displaced downward.

3) BLOCK-FAULTED SEQUENCE
is a sequence in a large section of rock in which differential vertical movement (upward and downward) has occurred between a series of blocks of the rock. Each block of rock is bounded on two sides by high angle faults and has been displaced downward or upward relative to the adjacent blocks of rocks.

FILL MATERIAL
is a man-made deposit of soil which is the result of sitework, earthwork, site leveling, and building pad construction activities. Fill material may be composed of materials obtained on-site or off-site.

DEFINITIONS
(continued)

JOINT
is a structural feature of a rock resulting from the brittle behavior of the rock. A joint is a fracture (crack) that is formed in the rock. It is characterized by zero or negligible displacement of the rock on one side of the fracture relative to the rock on the other side of the fracture, and by the pattern of the orientation of the fractures to each other.

SEDIMENTS
are an accumulation of materials such as dust, volcanic ash, gravels, sands, silts, clays, organic remains, etc. that have: a) been placed in suspension, transported by wind, water or glacier (ice), and then settled out or, b) organic material formed or precipitated in-situ (in place).

1) UNCONSOLIDATED SEDIMENTS
are formed when these materials remain in their original state subsequent to settling, i.e., no physical, chemical, or biological alterations have occurred, such that these materials remain loose and soft.

2) CONSOLIDATED SEDIMENTS
are formed when unconsolidated sediments undergo any one of several physical, chemical, or biological alterations to become firm and coherent (hard), i.e., to become a rock.

SLURRY TRENCH
is a vertical barrier constructed into the subsurface. This barrier is constructed of a soil/bentonite mixture by the slurry displacement method. A slurry trench serves as a vertical barrier to seepage in the subsurface.

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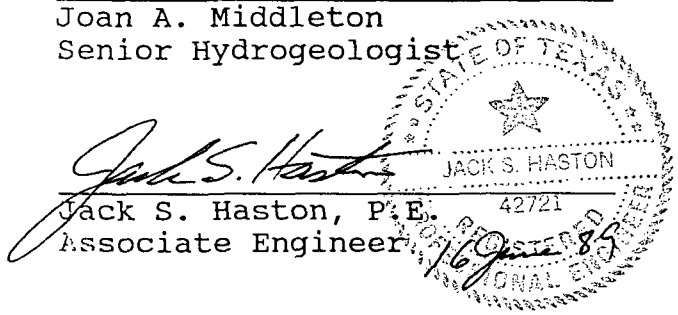

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EXECUTIVE SUMMARY

The Van Waters and Rogers, Inc. (VW&R), Dallas facility is located at 4707 Alpha Road, in the northeast quadrant of the intersection of Alpha and Welch Roads, in the City of Farmers Branch, Dallas County, Texas.

The facility was active from approximately 1968 until its closure in spring 1986. The facility's principle activities were warehousing, repackaging and distribution of various product chemicals. Many of the product chemicals were stored in above-ground tanks situated on concrete-diked containment structures.

In January 1987, after the facility had ceased operations, the above-ground storage tanks were dismantled. During the dismantling, strong chemical odors were recognized, prompting investigation by local and state regulatory agencies. It was discovered that various organic chemical compounds were present in samples of the clay fill material under the concrete-diked containment structures. In response to requests by the Texas Water Commission (TWC), VW&R initiated site investigation studies. These studies were conducted by Glenn G. Draper Engineering of Dallas, Texas (February 1987 to October 1987), Ecova Corporation of Redmond, Washington (April 1987 to May 1987), and Harding Lawson Associates of Dallas, Texas (October 1987 to present).

In July 1988, Harding Lawson Associates (HLA) administered a contract for the installation of a slurry trench surrounding the facility. The slurry trench provides for

the on-site retention (stabilization) of the organic chemical compounds detected in the subsurface. Subsequently, HLA conducted a site characterization study of the subsurface concerning the geology/hydrogeology, and the presence of organic chemical compounds and metals. The conclusions of this study are presented in this report. Harding Lawson Associates completed (drilled and logged) twenty-eight borings representatively located across the site, to define the geologic deposits encountered. Interpolation between these data points resulted in the interpretation of the site geology (structure and deposition). Hydrogeological conditions were then determined from water level measurements and the geologic structure and deposits encountered below the site. Samples of the sediments (unconsolidated/consolidated) were obtained at intermittent intervals from selected HLA borings for adequate representation of all the geologic deposits encountered. These samples were analyzed for the presence of chemical compounds which were indicative of the chemicals handled on the site, as well as metals. Samples of the groundwater were also collected by HLA from existing on-site groundwater monitoring wells and were analyzed for representative chemical compounds.

In summary, a physiographic depression (trough) in the Austin Chalk formation extends across the entire site in a north/south direction. This trough was the result of faulting within the chalk formation. The trough was subsequently filled with alluvial clay deposits. Chemical analyses indicate the presence of organic chemical compounds in the subsurface samples (unconsolidated/consolidated sediments and groundwater), particularly within this clay-filled trough.

The chemical compounds tend to be higher in concentration and laterally more extensive in the north/northwest section of the site.

I INTRODUCTION

The Van Waters and Rogers, Inc. (VW&R), Dallas facility is located at 4707 Alpha Road, in the northeast quadrant of the intersection of Alpha and Welch Roads, in the City of Farmers Branch, Dallas County, Texas. The site location is shown by Figure 1.

The facility was utilized for the packaging and distribution of the product chemicals identified in Table I. Primarily, the facility consisted of above-ground product storage tanks situated on two concrete-diked containment structures (concrete containment structures), a tank truck loading dock, a railcar loading/unloading dock, a 70,000 square foot warehouse and adjacent yard accommodating packaging, storage and shipping activities, and business offices. Approximately 77 percent of the 13.3-acre site is covered by concrete and/or asphalt (see Drawing 1 in the report illustrations for the layout of the facility). The VW&R Dallas Alpha Road Site was in operation from 1968 until Spring 1986.

While dismantling the above-ground product storage tanks in January 1987, strong chemical odors were recognized, prompting investigation by local and state regulatory agencies. Subsequently, surficial samples of the dark gray/black clay fill material and the ponded water underlying the concrete containment structures were collected on February 13, 1987. The samples were collected by representatives of the Texas Water Commission (TWC) and a VW&R consultant, Glenn G. Draper Engineering (Glenn Draper), of Dallas, Texas. The chemical analyses (February 1987) of the

II BACKGROUND

Subsequent to the dismantling of the product chemical storage tanks in January 1987, chemical analyses (February 1987) indicated the presence of various volatile organic chemical compounds in the clay fill material and the ponded water beneath the two concrete containment structures. Because of the concerns of potential sediment and groundwater contamination, the TWC then requested VW&R (March 9, 1987) to develop a comprehensive remedial action plan. In response, VW&R initiated additional on-site investigation studies which were conducted by Ecova, Glenn Draper, and HLA.

A remedial response plan (1987a) was initially prepared by Glenn Draper on March 26, 1987, in response to the March 9, 1987, TWC request. The field investigation study that was outlined in the Glenn Draper plan was subsequently initiated by Ecova. The investigative field work conducted by Ecova consisted of drilling and sampling twelve borings (GD-1 through GD-12), that ranged in depths from 4.0 to 17.5 feet below ground surface, in April 1987. These twelve borings penetrated the unconsolidated sediments (clay fill material and light tan-brown/gray silty to brown/gray alluvial clays) into the top of the consolidated sediment (Austin Chalk formation). Five of the borings (GD-3, GD-5, GD-6, GD-9, and GD-12) were subsequently completed as groundwater monitoring wells.

Representative sediment samples from each of the Ecova borings were collected for the analysis of volatile organic chemical compounds. Four of the samples were also analyzed

for the presence of semi-volatile organic chemical compounds. Samples of the groundwater were then collected from each monitoring well for the analysis of volatile organic chemical compounds (see Drawing 1 for the boring locations and Appendix A for the logs of the borings). The presence of volatile organic chemical compounds was indicated above detection limits (Table II) in all of the unconsolidated sediment samples (clay fill material and alluvial clays), as well as in the groundwater. The analytical results of the unconsolidated/consolidated sediments and groundwater samples, are presented in Appendices D and F, respectively. The conclusions of the Ecova site investigation study, including the analytical results, were presented in two documents dated May 12, 1987; Results of the Site Assessment (1987b), and the Proposed Site Remediation Plan (1987a).

Glenn Draper continued the site investigation study by drilling and sampling additional borings (GD-13 through GD-17) in July 1987, and later borings (GD-18 through GD-23) in September 1987. These eleven Draper borings ranged in depths from 5.0 to 20.0 feet below ground surface and penetrated through the unconsolidated sediments (clay fill material and alluvial clays) into the top of the consolidated sediment (chalk). Representative sediment samples were collected from each of the borings for the analysis of volatile organic chemical compounds. See Drawing 1 for the boring locations and Appendix B for the logs of borings.

Per TWC request (correspondence dated May 11, 1987), Glenn Draper also collected a background sample of the clay fill material, a surface water sample from an abandoned pipe

gallery, a sample of the "rinsewater from a steam cleaning hose", and a surficial soil sample adjacent to the north property fence line. These samples were also analyzed for volatile organic chemical compounds, which were indicated above detection limits (Table III) in all of the samples described above, excluding one. The analytical results of the unconsolidated/consolidated sediments (GD-13 through GD-23) are presented in Appendix D.

Conclusions of the Glenn Draper site investigation study (including the analytical results of each of the boring and miscellaneous samples collected) were presented in the October 1987 document, Van Waters and Rogers Alpha Road Site (1987b).

Subsequently, HLA was retained by VW&R in late October 1987 to continue site investigation studies. These studies included site characterization and remediation activities. On November 25, 1987, HLA submitted a Plume Stabilization Plan (1987) to TWC. The Plan proposed the installation of a slurry trench to provide the on-site retention (stabilization) of the organic chemical compounds present in the subsurface. The Plume Stabilization Plan was approved by the TWC in correspondence dated February 17, 1988.

In conjunction with the site characterization and plume stabilization activities, HLA drilled twenty-five (25) borings (HLA-1 through HLA-25) in April 1988, and three (3) additional borings (HLA-26 through HLA-28) in May 1988. The HLA borings ranged in depths from 12.0 to 48.5 feet and penetrated through unconsolidated sediments (clay fill material and alluvial clays) into the consolidated sediment (chalk).

See Drawing 1 for the boring locations and Appendix C for the logs of the borings.

Representative sediment samples from borings HLA-5 through HLA-10, HLA-12, HLA-13, and HLA-17 were collected and analyzed for volatile and semi-volatile organic chemical compounds and metals. Many of these chemical compounds were indicated above detection limits (Table IV) in the majority of the samples analyzed (see Appendix D for the analytical results).

On March 17, 1988, HLA also collected samples of equal volumes of the groundwater from monitoring wells GD-3, GD-5, GD-6, GD-9 and GD-12. The groundwater samples were composited into a single sample and analyzed for volatile and semi-volatile organic chemical compounds and metals. Many of these chemical compounds were indicated above detection limits (see Appendix F for detection limits and analytical results).

Following the field investigation, HLA designed and administered a construction contract for the installation of a slurry trench around the VW&R facility in July 1988, (reference Contract Completion Report, 1988b). The slurry trench surrounds the facility, excluding the undeveloped portion of the site which is to the east of the facility (see Drawing 2 for the location of the slurry trench). The slurry trench is completed into the top of the Austin Chalk formation to effectively prevent groundwater migration and therefore, provide the on-site retention (stabilization) of the organic chemical compounds present in the subsurface.

The conclusions of this site characterization study resulted from the review of a data base originating from the twenty-eight HLA borings, with additional information from the twelve Ecova borings, and the eleven Glenn Draper borings (Appendices C, A, and B, respectively).

The data base generated from the borings was comprised of information concerning the description of the physical properties of all materials encountered in the subsurface, the presence of groundwater and associated elevations, and the hydraulic properties (horizontal permeability) determined from representative in-situ (in place) formation tests. Groundwater samples, as well as representative samples of the unconsolidated (clay fill material and alluvial clays) and consolidated (chalk) sediments were analyzed for the presence of organic chemical compounds. The sediment samples were also analyzed for the presence of metals. This data is presented in the various tables and appendices of this report, and will be discussed and referenced throughout the text.

III SITE INVESTIGATION

The site investigation was an essential component of the site characterization process. This section discusses the two phases of the site investigation conducted by HLA: 1) the process of physically obtaining samples of the unconsolidated/consolidated sediments in the subsurface and, 2) the submittal of these samples (including groundwater) for chemical analyses, as well as a description of the analyses performed and the analytical methodologies utilized. The chemical analyses previously requested by Glenn Draper and Ecova for prior site investigations are discussed also.

The subsurface conditions at the site were investigated by HLA during April 5-18 and May 10 and 11, 1988. This included drilling and sampling twenty-eight borings to depths ranging from 12.0 to 48.5 feet below the existing ground surface (see Drawing 1 for boring locations). The HLA selection of the boring locations was initially based on prior site investigations which indicated that the local outcrop of the Austin Chalk formation was absent through a portion of the VW&R Dallas Alpha Road site. The absence of the Austin Chalk formation at the ground surface coincided with a topographic depression located near the western boundary, which is orientated in a north/south direction across the site. Because the topographic depression underlies a portion of the site, HLA drilled a number of borings along the entire north and south boundaries of the site. Additional borings were drilled along the western boundary of the site because of its proximity to the topographic depression, and to the above-ground product chemical storage

tank area. Several borings were also drilled along the axis of the topographic depression. The above-mentioned boring locations were specifically selected by HLA to provide appropriate data points for the interpretation of the geologic deposition and structure present below the VW&R Dallas Alpha Road site.

The unconsolidated/consolidated sediment samples that were collected for chemical analyses were selected from borings located: 1) in proximity to, and south of the product chemical storage tank area; 2) within the bounds of the topographic depression which is adjacent (east) to the product chemical storage tank area; and, 3) in an area of the site which had not been disturbed and was assumed unaffected by previous facility activities.

The sediment samples were collected at selected depth intervals so that all geologic deposits encountered below the site were represented.

A. Field Investigation

The services of Custom Coring, Inc., Houston, Texas, were retained by HLA for the drilling and sampling operations. The borings were advanced with a truck-mounted auger drill rig (Mobile B-53) for borings HLA-1 through HLA-27. A CME 45 auger drill rig was utilized at boring HLA-28. Potable water was introduced as drilling fluid for coring of the consolidated sediment (chalk). All drilling and sampling activities conducted by the drilling contractor and HLA personnel were in accordance with the HLA Job Health and Safety Plan (1988a).

Each boring was continuously cored utilizing a "MOSS" type split-barrel sampler to obtain undisturbed samples of the unconsolidated sediments (clay fill material and alluvial clays). An "NX" size double tube core barrel was utilized to obtain undisturbed samples of the consolidated sediment (chalk).

Senior professional HLA personnel supervised the field investigation activities, monitored, examined and logged the unconsolidated (clay fill material and alluvial clays) and consolidated (chalk) sediment samples, observed and recorded groundwater levels in the borings, and collected representative samples for chemical analyses. Samples of the unconsolidated sediments (clay fill material and alluvial clays) were monitored with an HNu photoionization detector for the presence of volatile organic vapors. Upon advancement into the consolidated sediment (chalk), the drilling fluid was monitored for the presence of the volatile organic compounds Acetone, Tetrachloroethene, and Toluene utilizing Drager detector tubes. In addition, intermittent samples were collected from each boring and submitted to a laboratory to be analyzed for the presence of total organic halogen (TOX). This analysis was used as a screening indicator for the presence of organic chemical compounds.

The consistency of each undisturbed sample was evaluated in the field utilizing a pocket penetrometer. This device provides a representative estimate of sediment consistency (unconfined compressive strength).

The surface elevations, total boring depths, core recoveries and rock quality indices, and the TOX and pocket

penetrometer values are recorded on the logs of the borings. Descriptions of the physical character of the unconsolidated/consolidated sediments and soil classification (based on the Unified Soil Classification System) are presented on the logs of the borings (see Appendix C).

Appropriate decontamination of all drilling and sampling equipment was conducted upon completion of each boring and each sampling event to prevent the introduction and/or cross-contamination of any chemical compounds encountered. Decontamination procedures were conducted in accordance with EPA guidelines and procedures outlined in the HLA Job Health and Safety Plan (1988a). Drilling and sampling wastes were drummed and labeled in accordance with the Department of Transportation (DOT) regulations. The drums are currently stored on-site.

Representative samples of the unconsolidated (clay fill material and alluvial clays) and consolidated (chalk) sediments were collected utilizing appropriate sampling equipment. The samples were placed in labeled, clean glass jars and sealed with Teflon[R]-lined lids and transferred to NDRC Laboratories, Inc., Dallas, Texas, in cooled down ice chests. Appropriate Chain-of-Custody forms were maintained.

Upon completion of the drilling and sampling activities, each boring was backfilled from total depth to ground surface with a bentonite-cement slurry.

On May 12, 1988, HLA conducted three in-situ formation tests to determine the permeability of the consolidated sed-

[R] Teflon is a registered trademark of E. I. Dupont Nemurs,Inc.

sections of the Austin Chalk formation) at the locations of borings HLA-26, HLA-27, and HLA-28 (see Drawing 1 for boring locations).

B. Chemical Analyses

1. Unconsolidated/Consolidated Sediments

Organic chemical compounds were detected in samples (February 1987) of the clay fill material and the ponded water underlying the two concrete containment structures. The TWC requested (March 9, 1987) a site investigation study which included the determination of the extent of the chemical compounds below the site. In response, HLA, Glenn Draper, and Ecova each included the sampling of the unconsolidated (clay fill material and alluvial clays) and consolidated (chalk) sediments below the site in their site investigation studies.

HLA collected representative samples in April 1988 at intermittent intervals in borings HLA-5 through HLA-10, and HLA-12, HLA-13, and HLA-17. These samples were analyzed for the volatile and semi-volatile organic chemical compounds and metals listed in Table IV. This table represents the purgeable (volatile organics), base/neutral and acid extractable (semi-volatile organics) compounds, and metals (inorganics) of the EPA Priority Pollutant List (1983b). This list represents many organic chemical compounds indicative of the product chemicals previously handled on the site.

Glenn Draper collected representative samples on July 20, 1987, and September 28, 1987, at intermittent intervals

in borings GD-13 through GD-17 and GD-18 through GD-23, respectively. These samples were analyzed for the volatile organic chemical compounds listed in Table III. This table represents the purgeable compounds (volatile organics) section of the EPA Priority Pollutant List (1983b).

Ecova collected representative samples on April 7 & 8, 1987, at intermittent intervals in borings GD-1 through GD-12. The samples were analyzed for the volatile and semi-volatile organic chemical compounds listed in Table II. This table represents the EPA Hazardous Substance List (1987a & 1987b) for purgeable compounds (volatile organics) and base/neutral and acid extractable compounds (semi-volatile organics). This list also represents many organic chemical compounds indicative of the product chemicals previously handled on the site. Alcohol and glycol compounds, as well as pH, nitrogen as ammonia (NH_3), and ignitability were also included in the chemical analyses. The analyses to determine ignitability and the presence of nitrogen as ammonia (NH_3) and semi-volatile organic chemical compounds were not conducted on all the samples collected.

NDRC Laboratories, Inc., Dallas, Texas, performed the chemical analyses of the samples collected by both HLA and Glenn Draper. The chemical analyses (organics) were performed in accordance with the analytical methods and guidelines of the Texas Water Commission, and EPA Publications SW-846; Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, method 8270 (1986b), and 600 4-79-020; Methods for Chemical Analysis of Water and Wastes, method 624 (1983a). The chemical analysis for the presence

of metals were performed in accordance with EPA methods 3050/200.7, 3050/206.3, 3050/245.1, 3050/270.3, and 70760/200.7. The chemical analyses of the samples collected by Ecova were performed in their laboratory in Redmond, Washington. Ecova outlines their sampling procedures, analytical methodologies and quality assurance (QA) in the document Results of the Site Assessment (1987b). The samples collected by Ecova were analyzed in accordance with EPA Publications SW-846, 600 4-79-020 and the Standard Methods for the Examination of Water and Wastewater (15th edition). The chemical analyses (organics) were conducted in accordance with methods 624/625 (EPA Publication 600 4-79-020) and 8240/8270 (EPA Publication SW-846). The laboratory documents detailing the QA of the analytical methods and procedures utilized by NDRC Laboratories, Inc., are presented in Appendix E.

The analytical results of the samples collected by HLA, Glenn Draper, and Ecova are presented on the prepared geologic logs (simplified) in Appendix D. Each log also displays the sample depth intervals. Listed adjacent to each sample interval are the volatile and semi-volatile organic chemical compounds and metals (if analyzed for) detected at that location, including their concentrations.

2. Groundwater

Included in the Ecova April 1987, investigative study, five borings were completed as groundwater monitoring wells: GD-3, GD-5, GD-6, GD-9, and GD-12. These five wells were screened for their entire depth, from ground surface to completion depth. The logs of these borings (see Appendix A) indicate they were completed through the uncon-

solidated sediments (clay fill material and alluvial clays) to the top of the consolidated sediment (chalk). Samples of the groundwater were collected and analyzed for purgeable compounds (volatile organics) included in the Hazardous Substance List, as well as pH (utilizing EPA methods 624/8240, and 1020). Volatile organic chemical compounds were detected in all five of the groundwater monitoring wells (see Appendix F for the analytical results).

HLA collected samples of the groundwater from the site's five monitoring wells on March 17, 1988 for a bench-scale groundwater treatment study. Equal volumes of the groundwater samples were composited into a single sample and submitted to NDRC Laboratories, Inc. This sample was analyzed for the volatile and semi-volatile organic chemical compounds listed in the EPA Appendix IX List (1987c), as well as the EPA Priority Pollutant List. Many of these chemical compounds were indicated above detection limits in the composited groundwater sample. The analytical results, including the analytical methods utilized, are presented in Appendix F.

IV SITE CONDITIONS

A. Regional Geology/Hydrogeology

1. Dallas County Geology

The VW&R Dallas Alpha Road site is mapped in the outcrop of the lower member of the Austin Chalk formation of Upper Cretaceous Age. This member consists primarily of massively bedded soft to moderately hard chalk which ranges from gray to tan in color. These chalks (commonly referred to as limestone materials) are fairly resistant to erosion and form prominent cuestas (gently sloping plains which are terminated on one side by steep slopes). Geologic dip is approximately 50 feet per mile to the east-southeast. The unweathered Austin Chalk is gray in color, but turns light tan or white due to leaching during the weathering process. Further weathering of the Austin Chalk produces chalky residual silty clays and clays ranging in color from light tan to dark brown, respectively. The residual clays exhibit a range of moderate to very high plasticity characteristics.

The Austin Chalk formation exhibits a significant amount of minor faulting. The faulting does not indicate any recent seismic or tectonic activity but was caused by geologic processes resulting from the northeast-southwest trending Ouachita orogenic fold belt which extends across the central United States. Locally, the axis of the fold belt extends approximately through the west Dallas County area in a north/northeast to south/southwest direction. These processes were subsequently influenced by the Gulf Geosyncline. The resulting faults are generally aligned in the strike direction which runs roughly from the southwest to the northeast. Grabens have been produced by faulting

and a secondary pattern of faulting and jointing somewhat perpendicular to the primary pattern has also developed. However, displacement of the various faults is usually less than ten feet. Faulting has not occurred in recent geologic history.

The faults provide discontinuities in the Austin Chalk structure which are prone to accelerated weathering. The faulted and jointed areas are also common locations for stream alignments. Near the faces of existing bluffs or cliffs, the joints resulting from fault movements reduce the strength of the rock and result in the movement of slump blocks.

Underlying the Austin Chalk is the Eagle Ford formation. The Eagle Ford is composed primarily of compaction shales of marine origin, which are gray to dark gray in color and contain occasional calcareous concretions. Thin beds of flaggy detrital limestone are found in the upper and basal zones of the formation. Bentonitic clay seams varying in thickness from very thin up to a maximum thickness of about one foot are common in the Eagle Ford formation. The Eagle Ford exhibits jointing and fracturing which often contains selenite.

Due to an unconformity at the contact between the Austin Chalk and Eagle Ford formations, a basal conglomerate consisting of reworked fossil material from the Eagle Ford exists at the very base of the Austin Chalk. This zone of material has been identified as the "Fish Bed" conglomerate. It is characterized by small black phosphatic pebbles, fish

remains, shark teeth and other detritus in a shaley limestone matrix.

The Woodbine formation lies below the Eagle Ford. The Woodbine is composed of sands and clays of deltaic, lagoonal, and alluvial origin.

Subsequent to the original deposition in the area of the site, various erosional processes removed much of the Austin Chalk and overlying formations. The resulting erosional surface was very irregular and was strongly influenced by differential weathering associated with faulting and jointing in the Austin Chalk formation. In more recent geologic history (Quaternary Age), redeposition of alluvial and colluvial sediments occurred. These materials exist to significant depths along present day creek or drainage alignments, with a maximum thickness of about 60 feet in the Trinity River flood plain on the Austin Chalk in Dallas County. The presence of these alluvial deposits in significant thickness (over about 15 to 20 feet) is often indicated by the presence of large taprooted trees such as pecans and members of the white oak family.

Upland soils in the Dallas County area are typically highly plastic black clays. In periods of drought, these soils develop deep, wide desiccation cracks due to their high shrink-swell potential. After repeated wet-dry cycles, these soils develop extensive secondary structures and can exhibit distinctive "gilgai" features (micro-relief structures) which include fissures, slickensides, and other water transmissive structures. Gilgai are more common in deeper clay deposits.

2. Dallas County Hydrogeology

Depending on season and area precipitation, groundwater may be encountered in the cracks and fissures in the near surface clays, at the contact between the Quaternary and Austin Chalk formations, in the weathered, more porous portions of the Austin Chalk, and in the joints or faults in the Austin Chalk. Often the groundwater is perched, indicating that a local zone of unconfined groundwater is separated from an underlying main body of groundwater by an unsaturated zone, particularly when associated with the Quaternary-Austin Chalk contact. This perched water occurs for two reasons: (1) the fissured structure of the Quaternary clay is more permeable than the chalk; and, (2) the contact zone may contain coarser reworked material than the chalk.

Regionally, groundwater movement occurs downdip; however, on a more local scale, shallow perched groundwater generally moves toward surface streams. Exposure of faults and/or the Quaternary-Austin Chalk contact often results in springs or seepage areas. Generally intermittent or ephemeral in nature, the quantity of water from these springs is dependent not only on very localized geologic features, but also on seasonal and area precipitation patterns. In urban areas, infiltrated water from area lawn and garden watering can be a significant factor affecting seepage rates. The shallow groundwater in the lower Austin generally moves laterally due to the underlying Eagle Ford aquiclude.

The shallowest major aquifer in the area is comprised of the channel sand deposits of the Woodbine formation. In Dallas County this aquifer is confined by 300-470 feet of Eagle Ford shale which acts as an aquiclude to vertical movement of groundwater. The Woodbine receives its water almost solely from infiltration (recharge) into its outcrop in eastern Tarrant County.

B. Site Geology

The VW&R Dallas Alpha Road Site is located near the western edge of the outcrop of the lower member of the Austin Chalk formation. The general surface elevation of the site and the structure map (Figure 2) both indicate a probable Austin Chalk thickness of about 100 feet. The isopach map of the Eagle Ford formation (Figure 3) and structure map of the top of the Woodbine formation (Figure 4) indicate that the Woodbine is approximately 500-600 feet below the site. It is separated from the Austin Chalk by over 400 feet of Eagle Ford shale.

The depositional and structural features encountered below the VW&R Dallas Alpha Road Site are illustrated in geologic cross-sections A though E (see Drawing 1 for cross-section locations and Drawings 4 through 8 for cross-sections).

Geologic cross-sections A through E were constructed from HLA and Glenn Draper boring logs, on or adjacent to the cross-section line. Cross-sections A and B, and C, D and E transverse the site in east/west and north/south directions, respectively. The subsurface profiles represent an interpretation of the geology (deposition and structure)

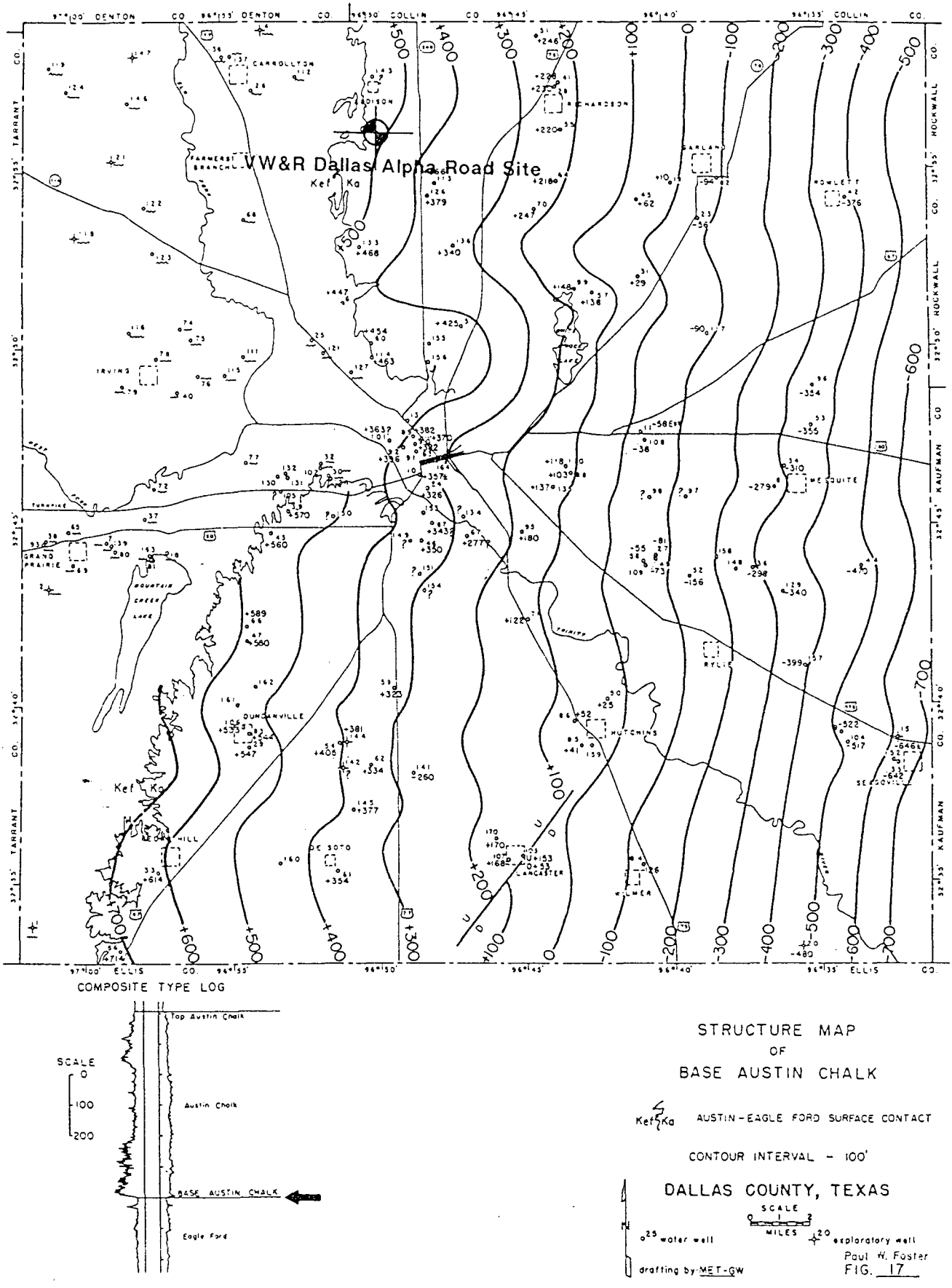


Figure 2. Structure Map of Base Austin Chalk from The Geology of Dallas County, p. 171.

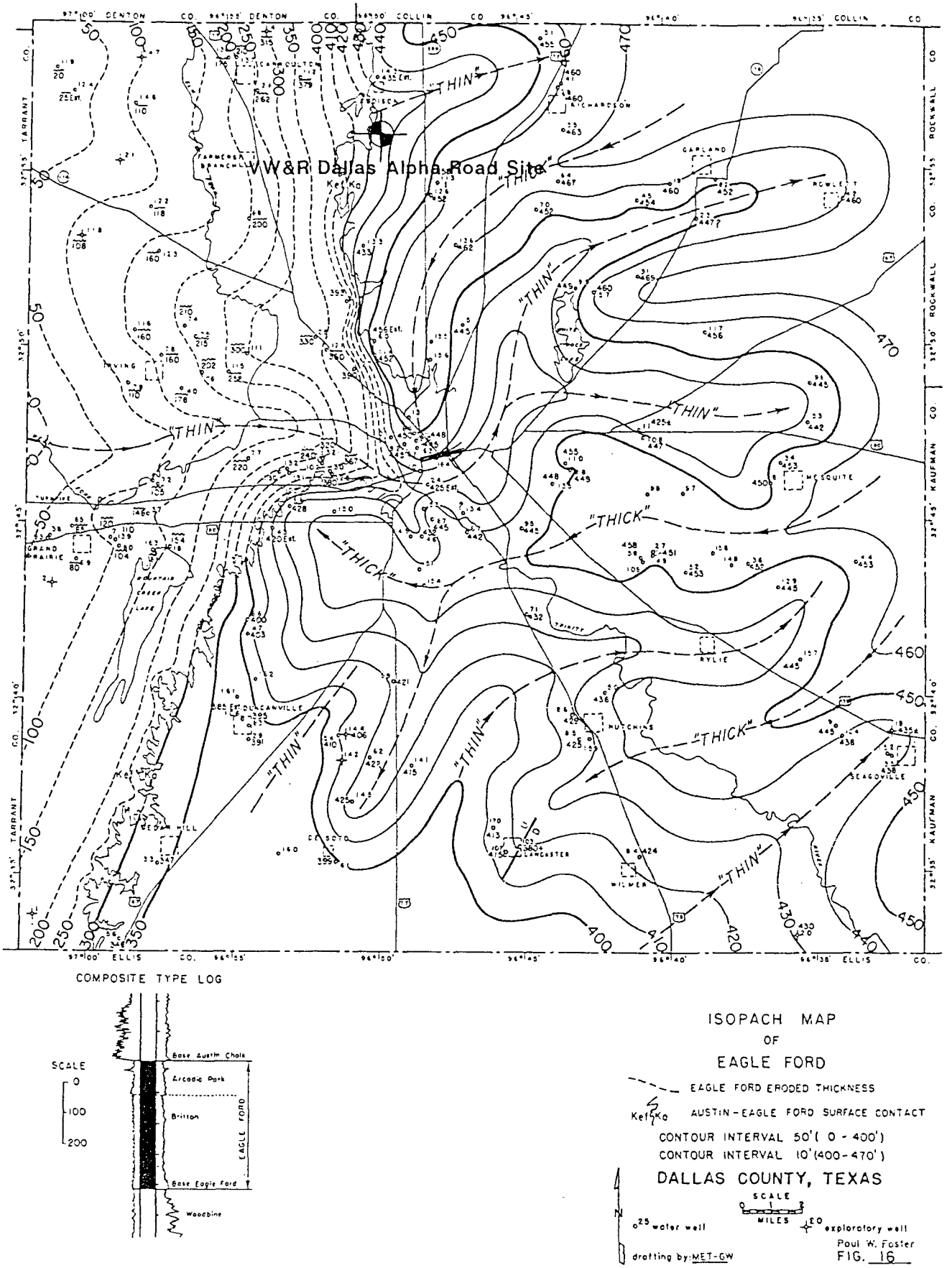


Figure 3. Isopach Map of Eagle Ford from The Geology of Dallas County, p. 170

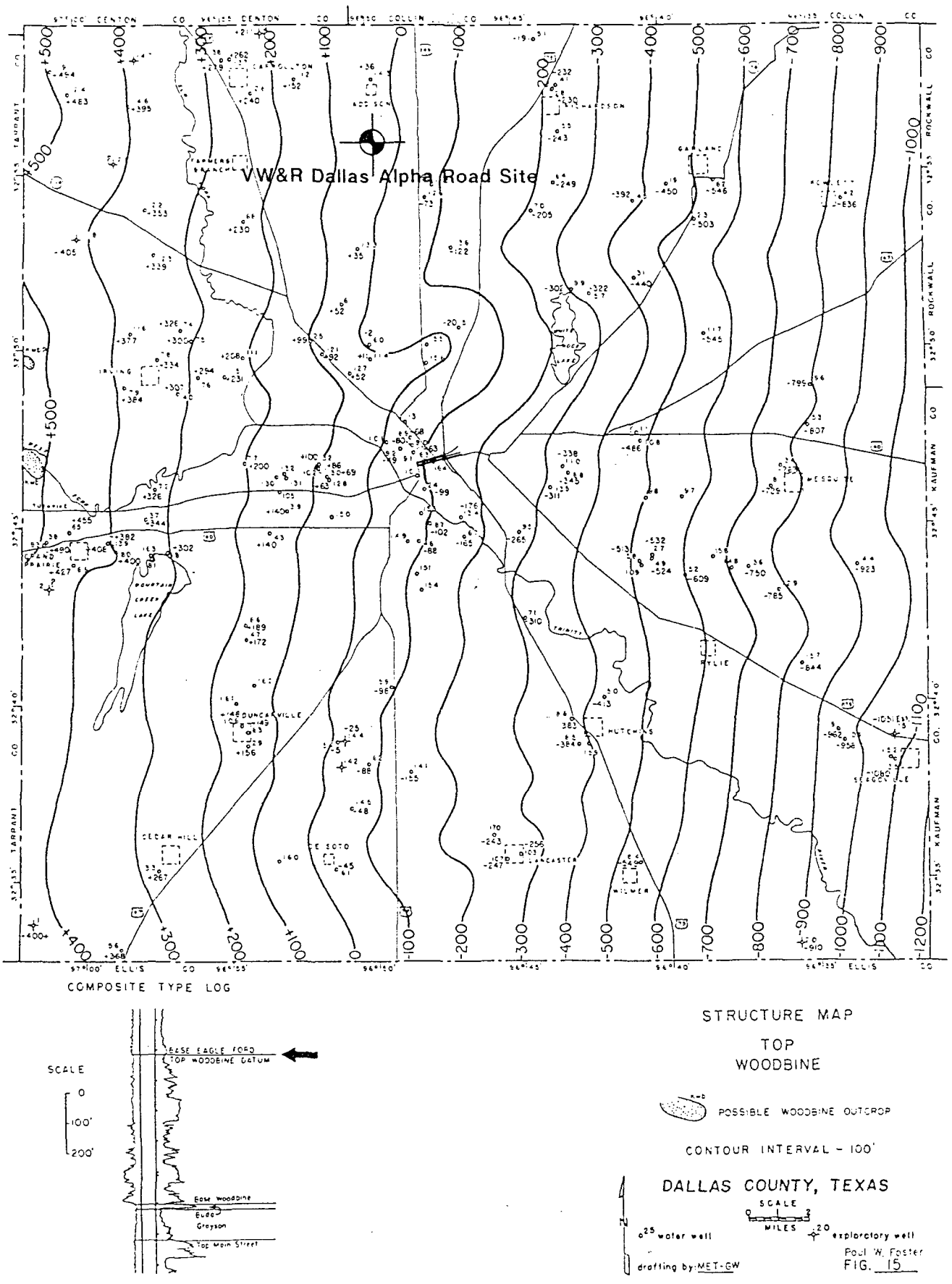


Figure 4. Structure Map Top Woodbine from The Geology of Dallas County, p. 168

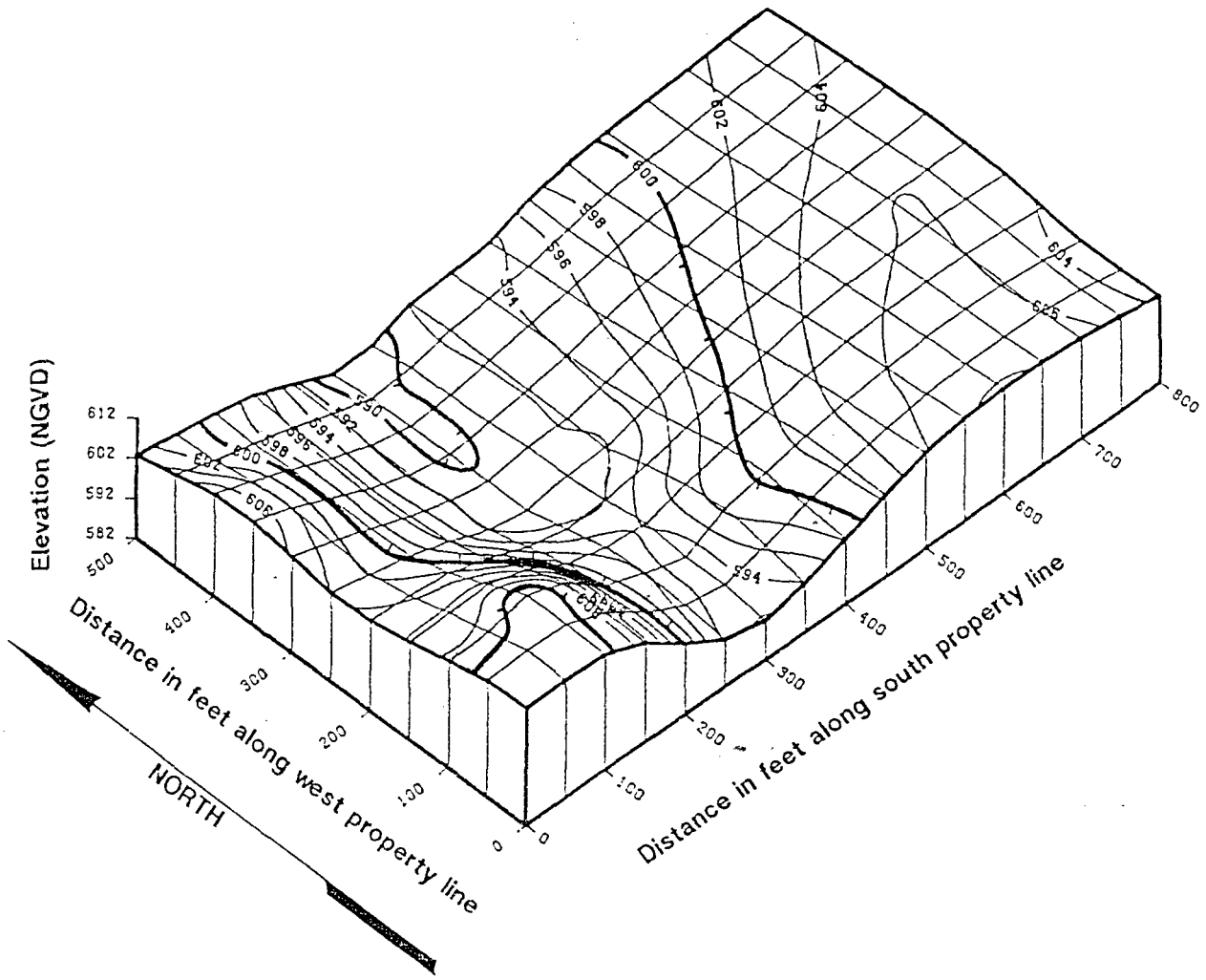
based on interpolation between each boring and the information obtained at these data points. The geologic/hydrogeologic interpretation of the site hereinafter discussed is referenced to the cross-sections.

1. Geologic Structure

The U.S. Geologic Survey (7.5-Minute Addison, Texas Quadrangle) indicates a surface drainage feature or swale in the northwest corner of the site. This drainage swale is associated with the head of Farmers Branch (creek), a tributary of the Elm Fork of the Trinity River. Farmers Branch (creek) flows from the Austin Chalk escarpment in a generally southwestward direction and is supplied by several springs from the shallow Austin Chalk formation. This surface drainage feature is also present in the south section of the site.

The swale is a surficial feature remnant of previous faulting (vertical displacement) and subsequent erosion within the weathered/unweathered Austin Chalk formation. The faulting is characterized by a central downthrown block fault (graben) which is bounded by a series of additional fault-bounded blocks, which were downthrown to a lesser extent. A physiographic depression (trough) within the surface of the chalk formation was resultant and subsequently filled with alluvial clay deposits. The axes of the near parallel block faults generally trend north/south across the site.

The fault-induced physiographic depression (trough) that extends across the site is illustrated in Figure 5,



NOTES :

1. This diagram depicts the general surface features of the gray unweathered Austin Chalk formation at the site. The contours are interpolative in nature, based on data from the borings. The locations and extent of faulting within the gray unweathered section is not specifically represented.

2. Surface contours are in feet of elevation (NGVD)

FIGURE 5
STRUCTURE MAP OF THE TOP OF
THE UNWEATHERED AUSTIN CHALK
VW&R DALLAS ALPHA ROAD SITE
FARMERS BRANCH, TEXAS

which depicts the general surface features of the gray unweathered Austin Chalk formation. The geologic structure encountered below the site is described further in Section VI. Discussion and Analyses.

2. Geologic Deposits

The geologic deposits (unconsolidated/consolidated sediments) encountered below the site are described from the HLA boring logs (in ascending order):

Upper Cretaceous Austin Chalk Formation (lower member)

Gray Unweathered Chalk

This chalk is the unweathered section of the Austin Chalk formation. It is gray in color, soft to hard, and fossiliferous. Shell partings and seams of marl (occasionally iron stained), clay and bentonitic clay are present. Faulting and jointing are present also. Locally, the gray unweathered chalk is estimated to be up to approximately 80 to 90 feet in thickness. This unweathered section grades upward into the tan weathered section of the Austin Chalk formation.

Tan Weathered Chalk

This weathered section of the gray Austin Chalk formation is tan in color, soft, and contains numerous fractures, many of which exhibit iron staining. The fossil content, shell partings, clay and bentonitic clay seams, and the sequence of faults and joints are characteristic of the weathered section of the Austin Chalk formation also. A highly variable thickness up to approximately 18 feet, is resultant of the faulting and erosional processes.

Quaternary Alluvial Clay Deposits

Light Tan-Brown/Gray Silty Clay (CL)

This Quaternary alluvial deposit of silty clay is light tan-brown to gray in color and exhibits firm to stiff, low to medium plastic soil properties (reference the Unified Soil Classification System in Appendix C). This silty clay exhibits iron staining and contains calcareous nodules, weathered limestone fragments and gravel seams consisting of the reworked Austin Chalk formation, which are indicative of its origin.

This silty clay is present only within the topographic depression caused by the sequence of block faults within the Austin Chalk formation. The depression channeled surface water flow which transported the silty clay (in suspension). The silty clay was then eventually deposited. The maximum observed thickness of this silty clay is approximately 13 feet.

Brown/Gray Clay (CH-CL)

This clay deposit presents a slight variation within the upper section of the Quaternary alluvial deposit of the light tan-brown/gray silty clay. Moist, firm to stiff soil properties (reference Unified Soil Classification System in Appendix C) were observed. This clay exhibits iron staining and contains calcareous and phosphatic nodules. This variation in the alluvial clay deposits was encountered only at the locations of borings HLA-8, HLA-10, HLA-13, HLA-14, and HLA-24. A maximum thickness of 10 feet was encountered.

Dark Gray/Black Clay Fill Material

A surface deposit up to approximately 13.5 feet thick of a dark gray/black clay is present within the boundaries of the site. This clay was not present in-situ (in place) at the site location, but was transported as fill material for site construction purposes. This clay exhibits moist, stiff to very stiff, highly plastic soil properties (reference Unified Soil Classification System in Appendix C). Sand, limestone fragments, calcareous nodules and/or fragments, gravel, wood, and roots were observed in the reworked clay. Sections of the alluvial clay deposit were excavated and filled with this reworked clay during site construction work. The clay fill was also placed on the site outcrop of the tan weathered section of the Austin Chalk formation.

C. Site Hydrogeology

A perched zone of groundwater was generally encountered within the alluvial clays above the tan weathered section of the Austin Chalk formation at the VW&R Dallas Alpha Road site.

The presence of groundwater and the depth encountered was recorded on the applicable borings at the time of drilling. This includes Ecova borings (GD-3, GD-5, GD-6, GD-9, and GD-12), Glenn Draper borings (GD-13, GD-14, GD-17, GD-21, and GD-23), and HLA borings (HLA-4A, HLA-8, HLA-12, HLA-13, HLA-14, HLA-15, and HLA-25). A perched water table was generally encountered in the light tan-brown/gray silty clay deposited within the physiographic depression (trough) as indicated on cross-sections A, B, and C, and boring logs

GD-3, GD-5, GD-6, GD-9, and GD-12, GD-13 and GD-14, and HLA-8. Perched groundwater was also encountered adjacent to the outer bounds of the physiographic depression in the dark gray/black clay fill material at the locations of borings GD-6 and HLA-12, and in the tan weathered chalk at the location of HLA-26. See Appendices A, B, and C for the water levels indicated on the logs of the borings. The presence of the perched groundwater zone was laterally and vertically more extensive in the north section of the site.

The hydraulic properties and characteristics of the subsurface were not determined and furthermore, with the addition of the slurry trench (July 1988), which surrounds the subsurface of the facility, it was no longer possible to determine the hydraulic gradient and direction of flow across the site. Prior to the installation of the slurry trench, groundwater levels in the alluvial clays ranged from 596.12 to 605.29 feet NGVD; however, a sufficient number of water level measurements were not recorded at any single time interval (measurements recorded in April, July, and September 1987, and April 1988) to determine the hydraulic gradient and direction of flow. Factors that may have influenced subsurface hydraulic conditions such as local topography, daily and/or seasonal effects, industrial activities, and jointing/faulting were also not addressed. Accordingly, quantitative conclusions were no longer possible regarding the hydraulic gradient and direction of flow; however, general experience would indicate that the flow of groundwater was in a north/northwest direction across the site toward Farmers Branch (creek). This would be supported by the northward slope of the Austin Chalk

formation and the more extensive erosional features within the tan weathered section of the Austin Chalk observed in the north section of the site.

On May 12, 1988, HLA conducted three in-situ formation tests to determine the horizontal permeability of the consolidated sediment of the weathered/unweathered Austin Chalk formation at the locations of borings HLA-26, HLA-27, and HLA-28 (see Drawing 1 for locations). The permeability tests (packer tests) were conducted in accordance with the Bureau of Reclamation Designation E-18 (1974). Coefficient of permeability values of 3.0×10^{-6} to 4.0×10^{-5} centimeters per second (cm/sec) in the tan weathered section, and 7.3×10^{-8} and 2.0×10^{-6} cm/sec in the gray unweathered section were obtained.

V DISCUSSION AND ANALYSES

The Discussion and Analyses is presented in two sections:

A. Geology
B. Results of the Chemical Analyses

A discussion of the geology is initially provided because of its influence upon the distribution and concentrations of the organic chemical compounds detected in the subsurface. Section B presents the analytical results and the status of these organic chemical compounds.

A. Geology

The block-faulted sequence and resultant structural and depositional features are described relative to an interpretation from the geologic cross-sections A through E (see Drawing 1 and Drawings 4 through 8). The sequence of faults in the gray unweathered section of the Austin Chalk formation are illustrated in cross-sections A-D. Specific analyses of each geologic cross-section are discussed in detail on the following pages.

A-A' (parallels the north perimeter of the site).
A central downthrown fault-bounded block (graben) is present between borings HLA-20 and HLA-14. This graben exhibits a cumulative maximum displacement within a series of block faults of approximately 21 feet. It is bounded to the east and west by a series of near parallel fault-bounded blocks. Two block faults are present to the west (in descending order) between

borings HLA-11 and HLA-12 and borings HLA-12 and HLA-20, with displacements of approximately 4.0 and 5.5 feet, respectively. Displacement between HLA-20 and the top of the central downthrown block (graben) is approximately 7.5 feet. Two block faults are present to the east (in descending order) between borings HLA-16 and HLA-17 and borings HLA-18 and HLA-19. These block faults are displaced approximately 9.0 and 2.5 feet, respectively. Displacement between HLA-14 and the top of the central downthrown block (graben) is approximately 7.5 feet.

B-B' (parallels the south perimeter of the site).
The block-faulted sequence identified to the north is also present in the south section of the site; however, it is laterally less extensive in this area. The central downthrown fault-bounded block (graben) is present between borings HLA-22 and HLA-24. This central downthrown block (graben) exhibits a cumulative maximum displacement within a series of block faults, of approximately 16 feet. However, some variation in the block-faulted sequence bounding the central downthrown block (graben) is present to the south. The fault-bounded blocks to the west are faulted on a smaller scale than to the north. These block faults (in descending order) are present between borings HLA-2 and HLA-22 and between borings HLA-22 and HLA-23, with displacements of approximately 4.0 and 2.5 feet, respectively. Displacement between HLA-23 and the top of the central downthrown block (graben) is approximately 10 feet. It also appears that one of the faults bounding the eastern fault plane of the central

downthrown block (graben) to the north has terminated; only one block fault is indicated to the east of the central downthrown block (graben) in cross-section B-B'. This block fault is located between borings HLA-6 and HLA-24, with a displacement of approximately 7.5 feet. Displacement between HLA-24 and the top of the central downthrown block (graben) is approximately 8 feet.

C-C' (parallels the west perimeter of the site).
Vertical displacement is indicated in the gray unweathered chalk between borings HLA-11 and HLA-9, HLA-9 and HLA-7, and HLA-7 and HLA-1, indicating a continuation of the block-faulted sequence to the west. However, an upthrown block (horst), which has been displaced approximately one foot, between borings HLA-11 and HLA-7 indicates that the block-faulted sequence has appeared to "branch" trending northwest/southeast. Maximum displacement of the gray unweathered chalk is approximately 5 feet between borings HLA-1 and HLA-7, and 6 feet between borings HLA-1 and HLA-11.

D-D' (transverses in a north/south direction midsection of the eastern half of the site).
Cross-section D is located within the fault planes of the central downthrown block (graben) and parallels the north/south trend of the fault axes. A downward vertical displacement of approximately 6 feet (between HLA-10 and HLA-13) is present.

E-E' (parallels east perimeter of the site).
Cross-section E transverses a structurally undisturbed

section under the site and represents the local character of the gray unweathered section of the Austin Chalk formation, a relatively flat-lying surface encountered at an elevation between approximately 608 and 606 feet (south to north), indicating a gentle slope to the north.

The fault planes (block-faulted sequence) encountered in the gray unweathered section of the Austin Chalk formation were projected to the present topographic surface to represent an interpretation (estimation) of their locations relative to the surficial features of the site (see Drawing 3 for the location of the faults). The termination depths of the fault planes encountered were unknown; however, it was assumed they terminated within the Austin Chalk formation because vertical displacement was not reported in the underlying Eagle Ford shale formation.

Associated with the block-faulted sequence are joints within the Austin Chalk formation. As with faults, these joints were formed by fracturing; however, the degree of displacement is zero or negligible. Regionally, jointing is present in the chalk formation. The exact degree and characteristics of the jointing imposed by the structural activity within the immediate vicinity of the site was not determined.

The physiographic depression (trough) resultant of the block faulting within the Austin Chalk formation has accommodated channeling of surface water flow in a northward direction across the site. The effects of the alluvial process is evident by the differential erosion (dramatic varia-

tion in thickness) of the tan weathered section of the Austin Chalk formation and the subsequent Quaternary deposition of alluvial sediments (light tan-brown/gray silty clay and brown/gray clay) within the bounds of the block-faulted sequence.

The differential erosion of the tan weathered chalk and subsequent alluvial deposits are observed in cross-sections A, B, C, and D (see Drawings 4 through 7). The characteristics of these features indicate that an alluvial channel was aligned with the eastern fault plane of the central downthrown fault-bounded block (graben) in the south section of the site. Transversing the site in a northward direction it appears the channel shifted and cut slightly west and paralleled the fault plane observed in cross-section D between borings HLA-10 and HLA-13. It is also indicated that alluvial activity was laterally more extensive to the north in conformance with the more extensive block-faulted sequence to the north.

B. Results of the Chemical Analyses

1. Unconsolidated/Consolidated Sediments

A data base consisting of the analytical results of all the samples collected from the unconsolidated (clay fill material and alluvial clays) and consolidated (chalk) sediments and groundwater was established. This data base was generated from three separate efforts of sample collection and chemical analyses. Sample collection occurred between April 1987 and April 1988, by Ecova (April 7 and 8, 1987), Glenn Draper (July 20, 1987 and September 28, 1987), and HLA (mid April; April 6, 7 and 13 through 16, 1988). The results of the chemical analyses were combined in order

to provide a larger distribution of data for the site. The analytical results of the Ecova, Glenn Draper, and HLA sampling efforts are presented in Appendix D.

A portion of the organic chemical compounds detected in the subsurface were selected and characterized in order to present representative data for interpretation. Various organic chemical compounds were selected for representation, based on their chemical characteristics and frequency of occurrence in the data base. These selected chemical compounds were subsequently grouped by their volatile and semi-volatile characteristics. The chemical compounds within the volatile and semi-volatile groups were then subdivided into chemical categories according to their chemical characteristics. The chemical categories selected provided the grouping of the chemical compounds by common characteristics, as well as representing the types of chemical compounds present in the subsurface. This categorization of the volatile and semi-volatile organic chemical compounds selected is outlined below:

a. Volatile Organic Compounds

Acetone
1,2-Dichloroethene(trans)
Ethylbenzene
Methyl Ethyl Ketone (2-Butanone)
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)
Methylene Chloride
Tetrachloroethene
Toluene
1,1,1-Trichloroethane
Trichloroethene
Xylenes (total)

b. Semi-Volatile Organic Compounds

bis(2-ethylhexyl)Phthalate
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
1,2-Diphenylhydrazine
di-n-Butylphthalate
di-n-Octylphthalate
Naphthalene
Phenol

The volatile and semi-volatile organic chemical compounds were subdivided into the following chemical categories:

a. Volatile Organic Compounds

Aromatics
Ethylbenzene
Toluene
Xylene

Halogenated Hydrocarbons
1,2-Dichloroethene (trans)
Methylene Chloride
Tetrachloroethene
1,1,1-Trichloroethane
Trichloroethene

Nonhalogenated Hydrocarbons
Methyl Ethyl Ketone (2-Butanone)
Methyl Isobutyl Ketone (4 Methyl-2-Pentanone)

Acetone

b. Semi-Volatile Organic Compounds

Phthalates
bis(2-ethylhexyl)Phthalate
di-n-Butylphthalate
di-n-Octylphthalate

Halogenated Hydrocarbons
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene

Polynuclear Aromatic Hydrocarbons
Naphthalene

Phenols
Phenol

A third group of chemical compounds were categorized based on their carcinogenicity. All the volatile and semi-volatile organic chemical compounds in the data base that were detected and could be identified as carcinogens were represented, regardless of their frequency of occurrence. The carcinogenic organic chemical compounds were grouped by carcinogen class as outlined below:

c. Carcinogens

Class A
Benzene
Vinyl Chloride

Class B
Chloroform
1,2-Dichloroethane
1,2-Diphenylhydrazine
Methylene Chloride
Trichloroethene

Class C
1,1-Dichloroethene
Tetrachloroethene

Drawings 9 through 20 represent the concentration distribution of each carcinogen class and chemical category of the volatile and semi-volatile organic chemical compound groups that have been detected in the unconsolidated (clay

fill and alluvial clays) and consolidated (chalk) sediments. The values displayed on the drawings represent a concentration for a chemical category and not an individual chemical compound, excluding Acetone. Acetone, which is considered a nonhalogenated hydrocarbon, is individually represented because significant concentrations were detected in the subsurface. The maximum or single chemical concentration detected within the group of chemical compounds selected to represent each chemical category (except Acetone) is what is indicated for the volatile and semi-volatile organic chemical compounds in Drawings 9 through 16. The chemical analyses for the presence of semi-volatile organic compounds in the unconsolidated/consolidated sediments were requested only by HLA. Therefore, the data base for semi-volatile compounds is less extensive. Drawings 17 through 20 indicate the maximum or single chemical concentration detected of a chemical compound from within each group of the chemical compounds in the data base that represent Class A, B, and C carcinogens.

Four drawings within each volatile, semi-volatile and carcinogen group are presented in order to represent the status of each of their chemical classes with respect to the geologic deposits in which they were detected: dark gray/black clay fill, light tan-brown/ gray silty clay, tan weathered chalk, and gray unweathered chalk.

Drawings 9 through 12 and Drawings 17 through 20 also indicate the areal distribution within the unconsolidated (clay fill material and alluvial clays) and consolidated (chalk) sediments of each volatile organic chemical category and carcinogen class, respectively. The distribution lines

indicated on these Drawings represent the detection limit of each chemical category or carcinogen class. The areal distribution of the semi-volatile organic chemical categories was not represented due to a very limited data base.

In conclusion, Drawings 9 through 20 present data only for the indication of concentrations (relative to source locations, depositional features, and geologic structure) within the specific chemical categories, excluding Acetone. Review of these drawings generally indicated:

a. Higher concentrations of the volatile and semi-volatile organic chemical compounds, and carcinogens occurred;

   i. Within the bounds of the central downthrown block fault (graben), particularly due east of the north and south concrete containment structures.

   ii. Within the dark gray/black clay fill material and the light tan/gray silty clay. Some organic chemical compounds were detected in the tan weathered and gray unweathered sections of the Austin Chalk formation, but to a lesser extent.

b. Distribution of volatile organic chemical compounds in the dark gray/black clay fill material, light tan-brown/gray silty clay, and the tan weathered chalk was laterally more extensive to the north of the site.

c. Chemical data was less frequent for the tan weathered and gray unweathered sections of the Austin Chalk formation.

d. Chemical data did not exist for the southern section of the site.

HLA also requested the chemical analyses for the presence of metals (from the priority pollutant list) in the samples obtained at the HLA borings HLA-5 through HLA-10, HLA-12, HLA-13, and HLA-17. From the analytical results, the range in metal concentrations in milligrams per kilogram (mg/kg) above detection limit were established for the clay fill material, alluvial clays, and the tan weathered and gray unweathered sections of the Austin Chalk formation. These ranges are outlined below:

DARK GRAY/BLACK CLAY FILL

METAL	CONCENTRATION RANGE (mg/kg)
Arsenic	5.2 - 14.7
Chromium	12.5 - 23.8
Copper	9.5 - 16.3
Lead	3.4 - 15.1
Mercury	0 .24 - 0 .90
Silver	2.5 - 3.3
Zinc	25.9 - 72.0

LIGHT TAN-BROWN/GRAY SILTY CLAY

METAL	CONCENTRATION RANGE (mg/kg)
Arsenic	3.5 - 15.0
Chromium	7.98 - 22.0
Copper	9.48 - 19.0
Lead	5.19 - 8.3
Mercury	0.43
Silver	3.5 - 6.8
Zinc	28.4 - 51.0

TAN WEATHERED CHALK

METAL	CONCENTRATION RANGE (mg/kg)
Arsenic	1.96 - 12.8
Cadium	2.0 - 34.0
Chromium	6.1 - 28.0
Copper	4.3 - 21.0
Lead	4.4 - 19.0
Mercury	0.28 - 0.39
Silver	0.4 - 5.0
Zinc	15.4 - 72.0
Selenium	100.0

GRAY UNWEATHERED CHALK

METAL	CONCENTRATION RANGE (mg/kg)
Arsenic	4.5 - 21.1
Chromium	3.1 - 9.3
Copper	5.5 - 16.5
Lead	5.1 - 15.6
Mercury	.10 - .81
Selenium	2.1
Zinc	16.9 - 42.3

The significance of these results were not determined because background information had not been established.

2. Groundwater

The groundwater collected at the locations of groundwater monitoring wells GD-3, GD-5, GD-6, GD-9, and GD-12 was representative of a small area in the immediate vicinity of the location of the concrete containment structures. These groundwater samples were collected by Ecova in April 1987 and HLA in March 1988. The Ecova analyses represented concentrations of organic chemical compounds for a limited area for one point in time. The HLA analytical results of the composited groundwater sample may not have provided true representation of the concentration of an organic chemical compound at a given sample location.

VI SUMMARY OF CONCLUSIONS

The conclusions of the Harding Lawson Associates site characterization study of the VW&R Dallas Alpha Road Site are summarized below:

A. Geology

The fill material and geologic deposits (unconsolidated/consolidated sediments) encountered below the site to a depth of 48.5 feet are listed in descending order:

Fill Material
Dark Gray/Black Clay Fill (CH)

Quaternary Alluvial Deposits (Unconsolidated)
Brown/Gray Clay (CH-CL)
Light Tan-Brown/Gray Silty Clay (CL)

Upper Cretaceous
Lower Member Austin Chalk Formation (Consolidated)
Tan Weathered Chalk
Gray Unweathered Chalk

The VW&R Dallas Alpha Road site is situated on the regional outcrop of the upper Cretaceous Austin Chalk formation. A sequence of block faulting (trending north/south) within the weathered/unweathered Austin Chalk formation was encountered. The block-faulted sequence consists of a central downthrown block fault (graben) which is bounded on both fault planes by a series of additional fault-bounded blocks. In general, the additional block faults were also been downthrown, however; to a lesser extent. The maximum cumulative displacement (resultant of the block-faulted sequence) within the Austin Chalk formation ranges from approximately 16.0 to 21.0 feet, in a northward direction

across the site. The block-faulted sequence is laterally more extensive to the north. As a result, a physiographic depression (trough) in the Austin Chalk formation exists across the entire site in a north/south direction.

The physiographic depression (trough) accommodated the channeling of surface water flow in a northward direction across the site. The effect of this alluvial process was evident by the differential erosion of the weathered section of the Austin Chalk formation and the subsequent deposition of alluvial sediments (light tan-brown/gray silty clay and brown/gray clay) within the bounds of the block-faulted sequence.

Associated with the block-faulted sequence were joints present within the Austin Chalk formation. The degree and characteristics of the joints was not determined.

B. Hydrogeology

A perched zone of groundwater was generally encountered within the alluvial clays (light tan-brown/gray silty clay and brown/gray clay) above the tan weathered section of the Austin Chalk formation. The perched groundwater zone was observed to be laterally and vertically more extensive in the north section of the site. Perched groundwater was also encountered outside the alluvial clays in the dark gray/black clay fill material at the locations of borings GD-6 and HLA-12, and in the tan weathered chalk at the location of HLA-26.

The hydraulic properties and characteristics of the subsurface were not determined and furthermore, with the

addition of the slurry trench (July 1988), which surrounds the subsurface of the facility, it was no longer possible to determine the hydraulic gradient and direction of flow across the site. Factors that may have influenced subsurface hydraulic conditions such as local topography, daily and/or seasonal effects, industrial activities, and jointing/faulting were not addressed. Accordingly, quantitative conclusions were no longer possible regarding the hydraulic gradient and direction of flow; however, general experience would indicate that the flow of groundwater was in a north/northwest direction across the site toward Farmers Branch (creek). This would be supported by the northward slope of the Austin Chalk formation and the more extensive erosional features within the tan weathered section of the Austin Chalk formation observed in the north section of the site. Groundwater could be moving downward into the Austin Chalk formation through the associated fault/joint system.

Three in-situ formation tests were conducted to determine the horizontal permeability of the consolidated sediment (tan weathered and gray unweathered sections of the Austin Chalk formation) at the locations of borings HLA-26, HLA-27, and HLA-28. Coefficient of permeability values of 3.0×10^{-6} to 4.0×10^{-5} centimeters per second (cm/sec) in the tan weathered section, and 7.3×10^{-8} and 2.0×10^{-6} cm/sec in the gray unweathered section were obtained.

C. Analytical Results

The collection of samples representative of the geologic deposits (unconsolidated/consolidated sediments) encountered below the site was resultant of three separate efforts. Sample collection of the unconsolidated (clay fill

material and alluvial clays) and consolidated (chalk) sediments was conducted by Ecova (April 7 and 8, 1987), Glenn Draper (July 20, 1987 and July 28, 1987), and HLA (mid April 1988, April 6, 7, 11, and 13-16, 1988). All samples were analyzed for the presence of selected volatile organic chemical compounds. Ecova also analyzed several samples for the presence of semi-volatile organic chemical compounds. Samples collected by HLA were also analyzed for the presence of semi-volatile organic chemical compounds, TOX, and metals. The analytical results of the three sampling events were combined to provide a larger distribution of data. The majority of the data represents the unconsolidated sediments (clay fill material and alluvial clays) in the north/northwest section of the site.

The analytical results indicated the presence of volatile and semi-volatile (based on a limited number of sample points) organic chemical compounds in the subsurface. These organic chemical compounds were located particularly in the dark gray/black clay fill material and the light tan-brown/gray silty clay within the bounds of the block-faulted sequence. Volatile and semi-volatile organic chemical compounds were detected in the tan weathered and gray unweathered sections of the Austin Chalk formation, but at much lesser concentrations and extent. The higher concentrations of organic chemical compounds were fairly localized in the unconsolidated sediments (clay fill material and alluvial clays) within the bounds of the central downthrown block fault (graben), particularly in the north section of the site.

The chemical analysis for the presence of metals was conducted on samples collected only at the HLA borings. Various metals were indicated above detection limits. The significance of these results was not determined because background information was not established.

Samples of the groundwater were collected at the locations of monitoring wells GD-3, GD-5, GD-6, GD-9, and GD-12 by Ecova in April 1987, and HLA in March 1988. The analytical results of both sampling events detected the presence of volatile and semi-volatile organic chemical compounds.

VII REFERENCES

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Code of Federal Regulations, Protection of Environment, Title 40 Part 261, Identification and Listing of Hazardous Waste; Appendix VIII. Hazardous Constituents, July 1, 1987b.

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Standard Methods for the Examination of Water and Wastewater, APHA/AWWA/WPCF 15th Edition.

DISTRIBUTION

7 copies to: Van Waters and Rogers, Inc.
1600 Norton Building
Seattle, Washington 98104

Attention: Mr. R. L. Lynch
Project Manager

JAM:JSH/jdz

QUALITY CONTROL REVIEW:

Pierce L. Chandler, Jr., P.E.
Principal Engineer

12: 055

12:056

TABLES

TABLE I

*PRODUCT CHEMICALS FOR PACKAGING AND DISTRIBUTION
VW&R DALLAS ALPHA ROAD SITE
1968 THROUGH SPRING 1986

PRODUCT CHEMICALS STORED IN THE
NORTH CONCRETE CONTAINMENT STRUCTURE

Acetone
n-Butyl Alcohol
Ethylene Glycol Monoethyl Ether Acetate (Cellosolve)
Ethylene Glycol Monobutyl Ether
Hexane
Isopropyl Alcohol
1,1,1-Trichloroethene
Methanol
Methyl Ethyl Ketone (2-butanone)
Methyl Isobutyl Ketone (4-methyl-2-pentanone)
n-Propyl Acetate
Tetrachloroethylene
1,1,1-Trichloroethane
Trichloroethene
Toluene
VMP Naptha
Xylene

Freon
Lacquer Solvent
Mineral Spirits
Solvent 100
Solvent 150
Vansol 200

PRODUCT CHEMICALS STORED IN THE
SOUTH CONCRETE CONTAINMENT STRUCTURE

Aqueous Ammonia (Amonia Hydroxide)
Hydrochloric Acid
Nitric Acid
Sulfuric Acid
Phosphoric Acid (75%)
Acintol (fatty acid)
Caustic Soda (commercial grade)
Caustic Soda (purified)
Caustic Potash
Plasticizer (Benzol Flex 988)
Surfactant (9N9)

*Information conveyed to Glenn L. Draper Engineering by Robert Sheffield, Van Waters & Rogers, Inc., March 18, 1987.

12:058

TABLE II

HAZARDOUS SUBSTANCE LIST/MISCELLANEOUS COMPOUNDS

ECOVA CORPORATION
APRIL 7 & 8, 1987

PURGEABLE COMPOUNDS (VOLATILE ORGANICS)
EPA METHODS 624/8240

	Low Level[1] Detection Limit (ug/kg or ug/l)	Medium Level[2] Detection Limit (ug/kg)
Chloromethane	10	1000
Bromomethane	10	1000
Vinyl Chloride	10	1000
Chloroethane	10	1000
Methylene Chloride	5	500
Acetone	10	1000
Carbon Disulfide	5	500
1,1-Dichloroethene	5	500
1,1-Dichloroethane	5	500
1,2-Dichloroethene (total)	5	500
Chloroform	5	500
1,2-Dichloroethane	5	500
2-Butanone	10	1000
1,1,1-Trichloroethane	5	500
Carbon Tetrachloride	5	500
Vinyl Acetate	10	1000
Bromodichloromethane	5	500
1,2-Dichloropropane	5	500
cis-1,3-Cichloropropene	5	500
Trichloroethene	5	500
Dibromochloromethane	5	500
1,1,2-Trichloroethane	5	500
Benzene	5	500
trans-1,3-Dichloropropene	5	500
Bromoform	5	500

TABLE II
(continued)

PURGEABLE COMPOUNDS (VOLATILE ORGANICS)
EPA METHODS 624/8240
(continued)

	Low Level[1] Detection Limit (ug/kg or ug/l)	Medium Level[2] Detection Limit (ug/kg)
4-Methyl-2-Pentanone	10	1000
2-Hexanone	10	1000
Tetrachloroethene	5	500
1,1,2,2-Tetrachloroethane	5	500
Toluene	5	500
Chlorobenzene	5	500
Ethylbenzene	5	500
Styrene	5	500
Xylenes (total)	5	500

TABLE II
(continued)

*BASE/NEUTRAL-ACID EXTRACTABLES (SEMI-VOLATILE ORGANICS)
EPA METHODS 625/8270

	Low Level[3] Detection Limit (ug/kg)
Phenol	330
bis(-2-Chloroethyl)Ether	330
2-Chlorophenol	330
1,3-Dichlorobenzene	330
1,4-Dichlorobenzene	330
Benzyl Alcohol	330
1,2-Dichlorobenzene	330
2-Methylphenol	330
N-Nitroso-di-n-propylamine	330
Hexachloroethane	330
Nitrobenzene	330
Isophorone	330
2-Nitrophenol	330
2,4-Dimethylphenol	330
Benzoic Acid	1600
bis(-2-Chloroethoxy)methane	330
2,4-Dichlorophenol	330
1,2,4-Trichlorobenzene	330
Naphthalene	330
4-Chloroaniline	330
Hexachlorobutadiene	330
4-Chloro-3-methylphenol	330
2-Methylhaphthalene	330
Hexachlorocyclopentadiene	330
2,4,6-Trichlorophenol	330
2,4,5-Trichlorophenol	1600
2-Chloronaphthalene	330
2-Nitroaniline	1600
Dimethylphthalate	330
Acenaphthylene	330
3-Nitroaniline	1600
Acenaphthene	330
2,4-Dinitrophenol	1600
4-Nitrophenol	1600
Dibenzofuran	330
2,4-Dinitrotoluene	330
2,6-Dinitrotoluene	330

12:061

TABLE II
(continued)

*BASE/NEUTRAL-ACID EXTRACTABLES (SEMI-VOLATILE ORGANICS)
EPA METHODS 625/8270
(continued)

	Low Level[3] Detection Limit (ug/kg)
4-Chlorophenyl-phenylether	330
Fluorene	330
4-Nitroaniline	330
4,6-Dinitro-2-methylphenol	1600
N-Nitrosodiphenylamine	330
4-Bromophenyl-phenylether	330
Hexachlorobenzene	330
Pentachlorophenol	1600
Phenanthrene	330
Anthracene	330
Di-n-butylphthalate	330
Fluoranthene	330
Pyrene	330
Butylbenzylphthalate	330
3,3'-Dichlorobenzidine	660
Benzo(a)anthracene	330
bis(2-Ethylhexyl)phthalate	330
Chrysene	330
Di-n-octyl phthalate	330
Benzo(b)fluoranthene	330
Benzo(k)fluoranthene	330
Benzo(a)pyrene	330
Ideno(1,2,3-cd)pyrene	330
Dibenzo(a,h)anthracene	330
Benzo(g,h,i)perylene	330

TABLE II
(continued)

ALCOHOL/GLYCOL COMPOUNDS

Methanol
Isopropanol
Butanol
Propylene Glycol

MISCELLANEOUS

pH
Nitrogen as Ammonia (NH_3)
Ignitability

[1]Detection limit based on 5 milliliters (ml) of water (milligrams per liter (mg/l)) or 5 grams (g) of soil (micrograms per kilogram (ug/kg)) uncorrected for percent moisture.

[2]Detection limit for medium level soil (micrograms per liter (ug/kg)) based on 5 g of soil extracted with 10 ml of methanol with 100 microliters (ul) analyzed uncorrected for percent moisture.

[3]Detection limits based on 30 g of soil uncorrected for percent moisture.

*The base/neutral-acid extractable compounds were analyzed only in the following four samples: GD-1 (1.0'-1.25'), GD-3 (12.0'-13.5'), GD-9 (8.0'-9.5'), and GD-12(7.0'-7.5').

TABLE III

*PRIORITY POLLUTANT LIST
VOLATILE ORGANIC CHEMICAL COMPOUNDS

GLENN G. DRAPER ENGINEERING
JULY 20, 1987 AND SEPTEMBER 28, 1987

PURGEABLE COMPOUNDS (VOLATILE ORGANICS)
EPA METHOD 624

	Detection Limit (ug/kg)[1]
Benzene	5.0
Bromoform	5.0
Bromomethane	10.0
Carbon tetrachloride	5.0
Chlorobenzene	5.0
Chlorodibromomethane	5.0
2-Chloroethylvinyl ether	5.0
Chloroethane	10.0
Chloroform	5.0
Chloromethane	10.0
Dichlorobromomethane	5.0
1,2-Dichlorobenzene	5.0
1,3-Dichlorobenzene	5.0
1,4-Dichlorobenzene	5.0
1,1-Dichloroethane	5.0
1,2-Dichloroethane	5.0
1,1-Dichloroethene	5.0
trans-1,2-Dichloroethene	5.0
1,2-Dichloropropane	5.0
cis-1,3-Dichloropropene	5.0
trans-1,2-Dichloropropene	5.0
Ethylbenzene	5.0
Methylene chloride	25.0
1,1,2,2-Tetrachloroethane	5.0
Tetrachloroethene	5.0
Toluene	5.0
1,1,1-Trichloroethane	5.0
1,1,2-Trichloroethane	5.0
Trichloroethene	5.0
Trichlorofluoromethane	10.0
Vinyl Chloride	10.0

12:064

TABLE III
(continued)

[1]Micrograms per kilogram

* This list does not represent the complete priority pollutant list. The analyses for semi-volatile organic compounds, metals, and pesticide and dioxin compounds were not requested.

TABLE IV

*PRIORITY POLLUTANT LIST
ORGANIC/INORGANIC CHEMICAL COMPOUNDS

HARDING LAWSON ASSOCIATES
APRIL 1988

PURGEABLE COMPOUNDS (VOLATILE ORGANICS)
EPA METHOD 624

	Detection Limit (ug/kg)[1]
Benzene	5.0
Bromoform	5.0
Bromomethane	10.0
Carbon tetrachyloride	5.0
Chlorobenzene	5.0
Chlorodibromomethane	5.0
2-Chloroethylvinyl ether	5.0
Chloroethane	10.0
Chloroform	5.0
Chloromethane	10.0
Dichlorobromomethane	5.0
1,2-Dichlorobenzene	5.0
1,3-Dichlorobenzene	5.0
1,4-Dichlorobenzene	5.0
1,1-Dichloroethane	5.0
1,2-Dichloroethane	5.0
1,1-Dichloroethene	5.0
trans-1,2-Dichloroethene	5.0
1,2-Dichloropropane	5.0
cis-1,3-Dichloropropene	5.0
Ethylbenzene	5.0
Methylene chloride	25.0
1,1,2,2-Tetrachloroethane	5.0
Tetrachloroethene	5.0
Toluene	5.0
1,1,1-Trichloroethane	5.0
1,1,2-Trichloroethane	5.0
Trichloroethene	5.0
Trichlorofluoromethane	10.0
Vinyl Chloride	10.0

12:066

TABLE IV
(continued)

BASE/NEUTRAL EXTRACTABLES (SEMI-VOLATILE ORGANICS)
EPA METHOD 8270

	Detection Limit (ug/kg)
Acenaphthene	150
Acenaphthylene	150
Anthracene	150
Benzidine	1500
Benzo(a)anthrancene	150
Benzo (b)fluorathene	150
Benzo(k)fluoranthene	150
Benzo(a)pyrene	150
Benzo(ghi)perylene	150
Butyl benzyl phthalate	150
4-Bromophenyl phenyl ether	150
bis(2-Chloroethyl)ether	150
bis(2-Chloroethoxy)methane	150
bis(2-Ethylhexyl)phthalate	150
bis(2-Chloroisopropyl)ether	150
2-Chloronaphthalene	150
4-Chlorophenyl phenyl ether	150
Crysene	150
Dibenzo(a,h)anthracene	150
di-n-Butylphthalate	150
Dichlorobenzenes	150
3,3'-Dichlorobenzidine	600
Diethylphthalate	150
Dimethylphthalate	150
2,4-Dinitrotoluene	150
2,6-Dinotrotoluene	150
di-n-Octylphthalate	150
Dioxin (2,3,7,8-TCDD)	---
1,2-Diphenylhydrazine	150
Fluoranthene	150
Fluorene	150
Hexachlorobenzene	150
Hexachlorobutadiene	150
hexachlorocyclopentadiene	150
Hexachloroethane	150

TABLE IV
(continued)

BASE/NEUTRAL EXTRACTABLES (SEMI-VOLATILE ORGANICS)
EPA METHOD 8270

	Detection Limit (ug/kg)
Indeno(1,2,3-cd)pyrene	150
Isophorone	150
Naphthalene	150
Nitrobenzene	150
N-Nitrosodimethylamine	150
N-Nitrosodiphenylamine	150
N-Nitrosodi-n-propylamine	150
Phenanthrene	150
Pyrene	150
1,2,4-Trichlorobenzene	150

TABLE IV
(continued)

ACID EXTRACTABLES
EPA METHOD 8270

	Detection Limit (ug/kg)
4-Chloro-3-methylphenol	150
2-Chlorophenol	150
2,4-Dichlorophenol	150
2,4-Dimethylphenol	150
2,4-Dinitrophenol	1500
2-Methyl-4,6-dinitrophenol	1500
2-Nitrophenol	150
4-Nitrophenol	1500
Pentachlorophenol	1500
Phenol	150
2,4,6-Trichlorophenol	150

METALS (INORGANIC)

	Analytical Method	Detection Limit (mg/kg)[2]
Antimony	3050/200.7	1.0
Arsenic	3050/206.3	0.10
Beryllium	3050/200.7	1.0
Cadmium	3050/200.7	1.0
Chromium	3050/200.7	1.0
Copper	3050/200.7	1.0
Lead	3050/200.7	1.0
Mercury	3050/245.1	0.05
Nickel	3050/200.7	1.0
Selenium	3050/270.3	0.10
Silver	3050/200.7	1.0
Thallium	3050/200.7	1.0
Zinc	3050/200.7	1.0
Cyanide		1.0

TABLE IV
(continued)

[1] ug/kg - Micrograms per kilogram

[2] mg/kg - Milligrams per kilogram

*This list does not represent the complete priority pollutant list. The pesticide and dioxin compounds were not included for analyses.

ONE STORY BRICK WAREHOUSE
FINISHED FLOOR ELEVATION=617.34

TRACT 1

TRACT 2

HLA-26
ELEV. 612.70

HLA-27
ELEV. 612.70

HLA-28
ELEV. 612.74

CONCRETE LOADING DOCK (COVERED)

CONCRETE PAVEMENT

ASPHALT PAVING

EDGE OF LOADING DOCK

COVERED TROUGH

CONCRETE PIT

CONCRETE LOADING DOCK

GRATE INLET

EXISTING BUILDING

WELCH ROAD — 60.00' R.O.W.

ALPHA ROAD — 60.00' R.O.W.

BENCH MARK ELEV.=613.01

SCALE IN FEET
80 0 80

LEGEND

- FIRE HYDRANT (F.H.)
- CHAIN LINK FENCE
- FACE OF BUILDING
- CONCRETE PAVING
- ASPHALT PAVING
- GRAVEL PARKING
- T.O.R. TOP OF RISER
- BORING MADE BY GLENN DRAPER CONTRACT (DENOTED GD-XX)
- BORING MADE BY HARDING-LAWSON ASSOCIATES (DENOTED HLA-XX)
- BENCH MARK
- RAILROAD TRACK
- PROPERTY LINE

HLA 26, 27 & 28	11/19/88	HLA borings HLA-26, HLA-27 & HLA-28 were added
HLA 22 & 23	11/19/88	HLA borings HLA-22 & HLA-23 were corrected
A-A'	11/22/88	Cross-section A-A' was relabled to B-B'
B-B'	11/22/88	Cross-section B-B' was relabled to A-A'

HARDING LAWSON ASSOCIATES
Engineers, Geologists & Geophysicists

BORING LOCATIONS

V W & R DALLAS ALPHA ROAD SITE
FARMERS BRANCH, TEXAS

SIGNATURES		DATE
DR. F.M.	CHK.	1/89
CH.	APP.	1/89

PROJECT NO. 09695,091.15

SHEET NO. 1 OF 20

vwrbor1

12:071

12:071

WELCH ROAD

ALPHA ROAD

60.00' R.O.W.

P.I. STA. 14+82.88
Δ=90°0'40" LT.

P.I. STA. 19+30.74
Δ=90°7'20" LT.

P.I. STA. 7+48.77
Δ=88°59'42" LT.

P.I. STA. 2+73.76
Δ=89°42'18" LT.

P. I. STA. 23+97.97
Δ=19°48'29" RT.

P. I. STA. 0+85.56
Δ=19°48'29" LT.

BEGIN TRENCH
STA. 0+00

STA. 0+50 =
STA. 24+47.97
END TRENCH

50' OVERLAP

ONE STORY BRICK WAREHOUSE
FINISHED FLOOR ELEVATION=817.34

TRACT 1

TRACT 2

COVERED CONCRETE LOADING DOCK

CONCRETE LOADING DOCK

CONCRETE PIT

LOADING DOCK

TOP OF RETAINING WALL

COVERED TRENCH

EXISTING CONC. BUILDING 9/9A&B AND WATER SERVICE

RAILROAD SPUR

CONCRETE PAVING

EDGE OF LOADING DOCK

GRAVEL

CONCRETE PAVEMENT

ASPHALT PARKING

CONC. CURB

ENTRANCE DOOR (TYP.)

ROLL-UP DOORS (TYP.)

FENCE & EDGE OF CONC.

GRATE INLET

LIGHT POLE

EXISTING BUILDING

4" STORM SEWER

CONC. PLANE

MONITOR WELL 60-3

MONITOR WELL 60-8

MONITOR WELL 60-6

MONITOR WELL 60-9

MONITOR WELL 60-12

80 0 80

SCALE IN FEET

LEGEND

- FIRE HYDRANT (F.H.)
- IRON ROD SURVEY MARKER
- CHAIN LINK FENCE
- NEW FENCE (BY CONTRACTOR)
- FACE OF BUILDING
- CONCRETE PAVING
- ASPHALT PAVING
- GRAVEL PARKING
- MONITOR WELL
- MANHOLE (M.H.)
- TELEPHONE MANHOLE
- POWER POLE (P/P)
- RAILROAD TRACK
- PROPERTY LINE
- SLURRY TRENCH

HARDING LAWSON ASSOCIATES
Engineers, Geologists & Geophysicists

SLURRY TRENCH ALIGNMENT

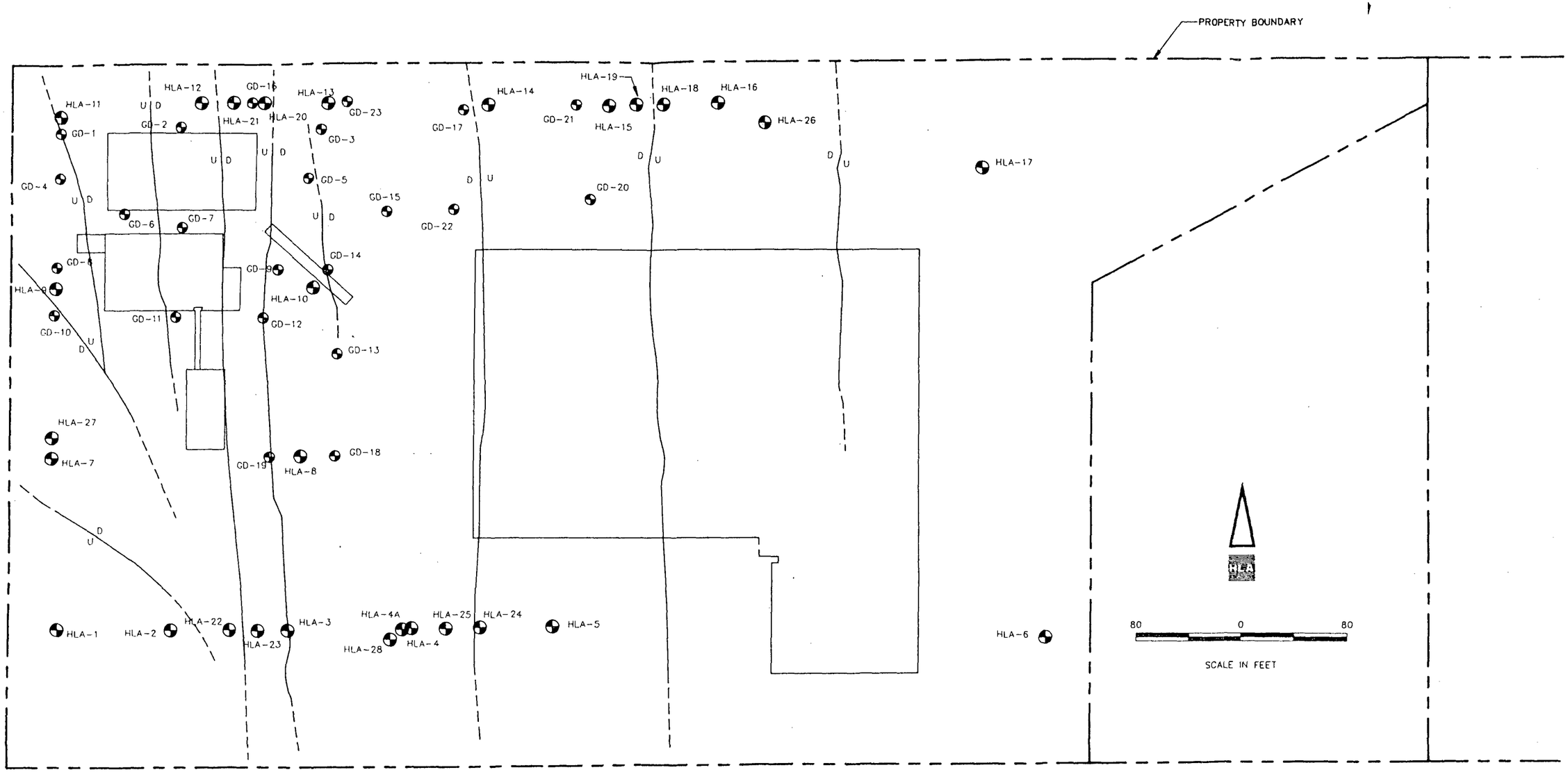
V.W. & R. Dallas Alpha Road Site
Farmers Branch, Texas

SIGNATURES	DATE	PROJECT NO.	SHEET NO.	OF
F.M.	1/89	09695,091.15	2	20
	1/89			

vwrbor2

12:072

12:072



LEGEND

- BORINGS BY HARDING LAWSON ASSOCIATES
- BORINGS BY GLENN DRAPER (contract)
- FAULT (INFERRED)
  U–UPTHROWN D–DOWNTHROWN
  (INDICATES DIRECTION OF DISPLACEMENT)

HARDING LAWSON ASSOCIATES
Engineers, Geologists & Geophysicists

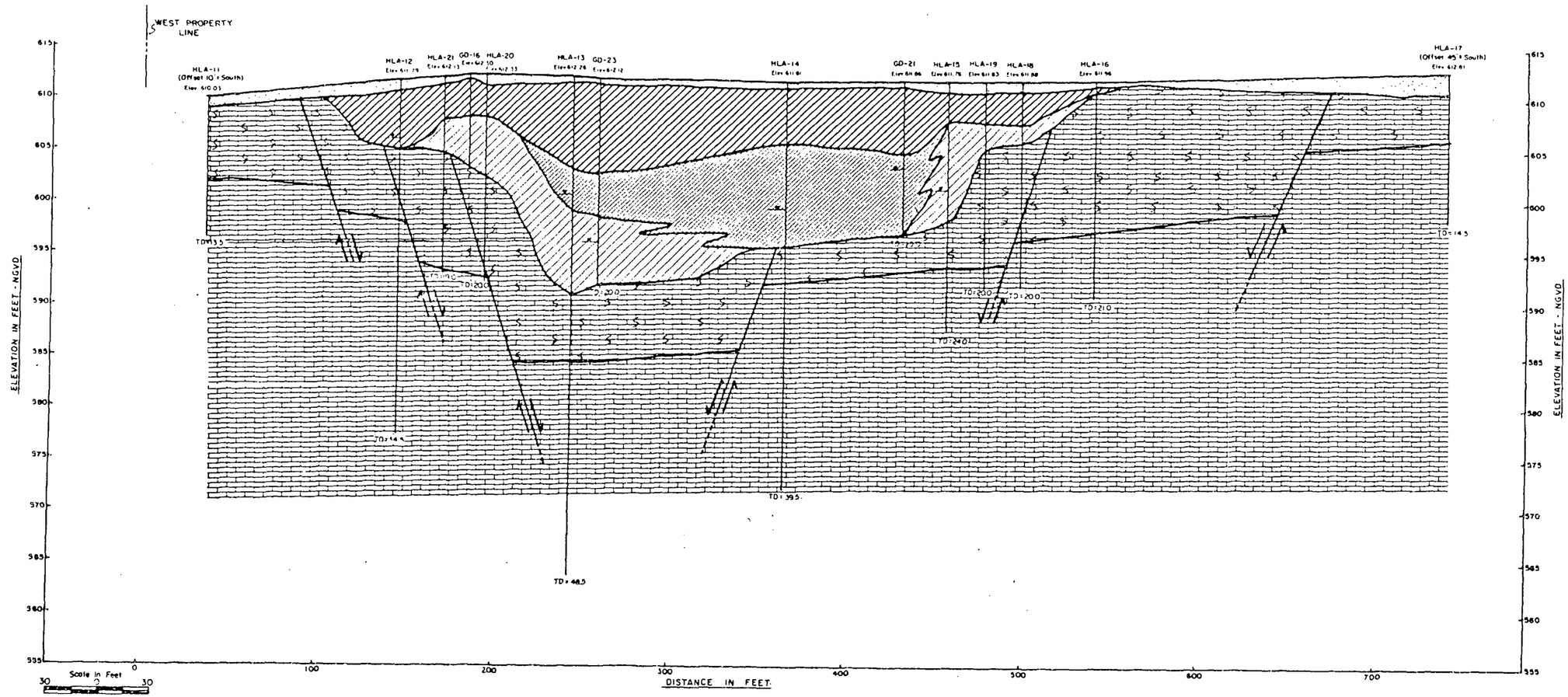
Locations of Faults
(inferred)

V.W. & R. Dallas Alpha Road Site

SIGNATURES		DATE	PROJECT NO.	SHEET NO.	OF
DES. F.W.	DRWN.	1/89	09695,091.15	3	20
CHK.	APPVD.				

VWRBOR3

12:073



See Drawing 1 for Cross-Section Location.

GEOLOGIC CROSS-SECTION A-A'

SCALE: VERT. 1" = 5' HORIZ. 1" = 30'

EXPLANATION

PAVEMENT ; Concrete and Cushion Sand

FILL MATERIAL ; Dark Gray / Black Clay (CH)

Quaternary — ALLUVIAL DEPOSITS
Brown / Gray Clay (CH-CL)

Light Tan-Brown / Gray Silty Clay (CL)

Upper Cretaceous — LOWER MEMBER AUSTIN CHALK FORMATION
Tan Weathered Chalk
Gray Unweathered Chalk

Inferred Fault (Arrows Indicate Direction of Displacement)

TD = Total Depth of Boring

Water Level — Date of measurement: GD Logs 9/87, HLA Logs 4/88

Harding Lawson Associates
Engineers Geologists & Geophysicists

Geologic Cross-Section A-A'

V W & R Dallas Alpha Road Site

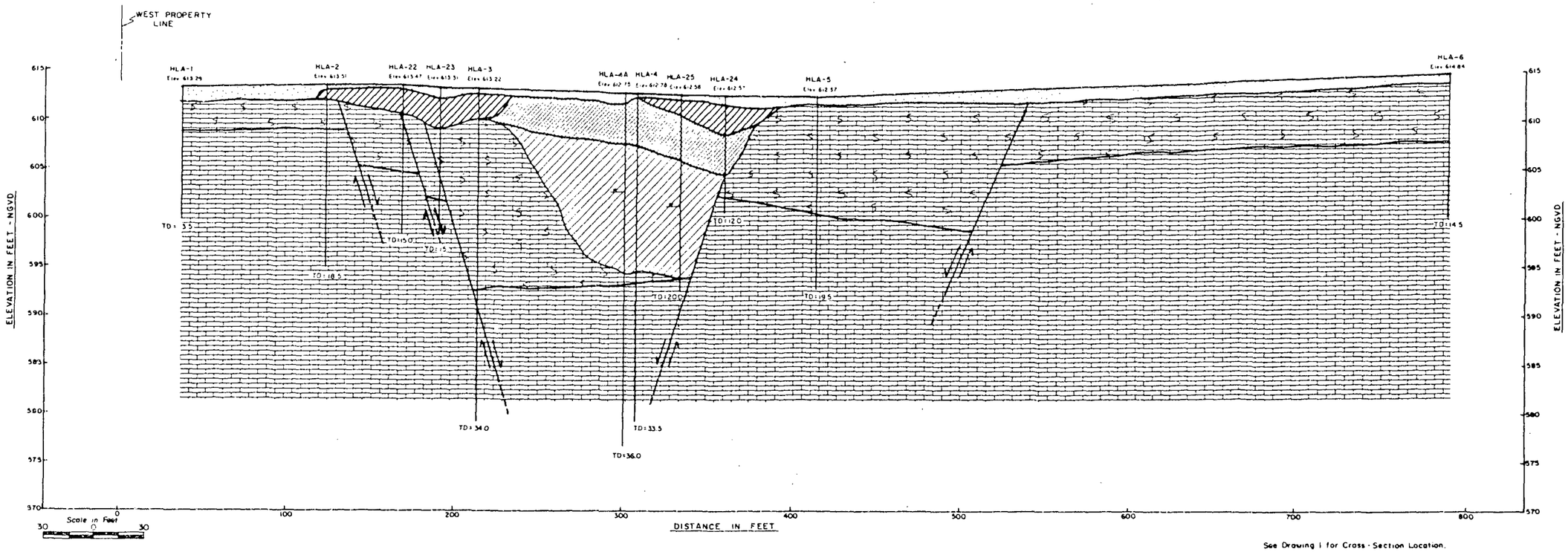
SIGNATURES		DATE
DR.	ENG.	
CH.	APPR.	

PROJECT NO. 09693, 091.15

SHEET NO. 4 OF 20

REVISIONS	DATE	DESCRIPTION

12:074



See Drawing 1 for Cross-Section Location.

GEOLOGIC CROSS-SECTION B-B'

SCALE: VERT 1" = 5 HORIZ. 1" = 30'

EXPLANATION

PAVEMENT ; Concrete and Cushion Sand

FILL MATERIAL ; Dark Gray / Black Clay (CH)

Quaternary

ALLUVIAL DEPOSITS

Brown / Gray Clay (CH-CL)

Light Tan-Brown / Gray Silty Clay (CL)

Upper Cretaceous

LOWER MEMBER AUSTIN CHALK FORMATION

Tan Weathered Chalk

Gray Unweathered Chalk

Inferred Fault
(Arrows indicate Direction of Displacement)

TD = Total Depth of Boring

Water Level
Date of measurement
GD Logs 9/87
HLA Logs 4/88

Harding Lawson Associates
Engineers, Geologists
& Geophysicists

Geologic Cross-Section
B-B'

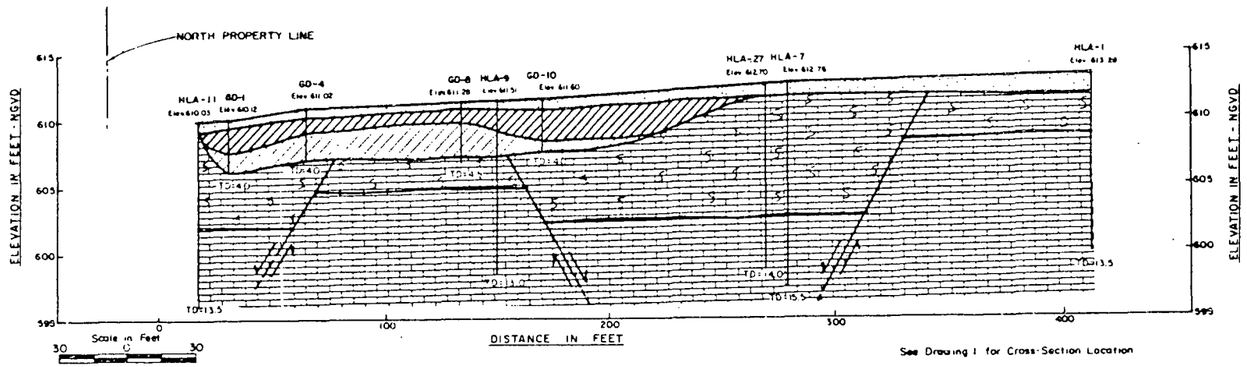
V.W.&R. Dallas Alpha Road Site

SIGNATURES		DATE
DR.	ENG.	
CH.	SPEC.	

PROJECT NO. 09695, 091.15

SHEET NO. 5 OF 20

REVISIONS	DATE	DESCRIPTION



GEOLOGIC CROSS-SECTION C-C'

SCALE: VERT. 1" = 5' HORIZ. 1" = 30'

EXPLANATION

PAVEMENT ; Concrete and Cushion Sand

FILL MATERIAL ; Dark Gray / Black Clay (CH)

Quaternary — ALLUVIAL DEPOSITS

Brown / Gray Clay (CH-CL)

Light Tan-Brown / Gray Silty Clay (CL)

Upper Cretaceous — LOWER MEMBER AUSTIN CHALK FORMATION

Tan Weathered Chalk

Gray Unweathered Chalk

Inferred Fault
(Arrows indicate Direction of Displacement)

TD = Total Depth of Boring

Harding Lawson Associates
Engineers Geologists
& Geophysicists

Geologic Cross-Section
C-C'

V.W. & R. Dallas Alpha Road Site

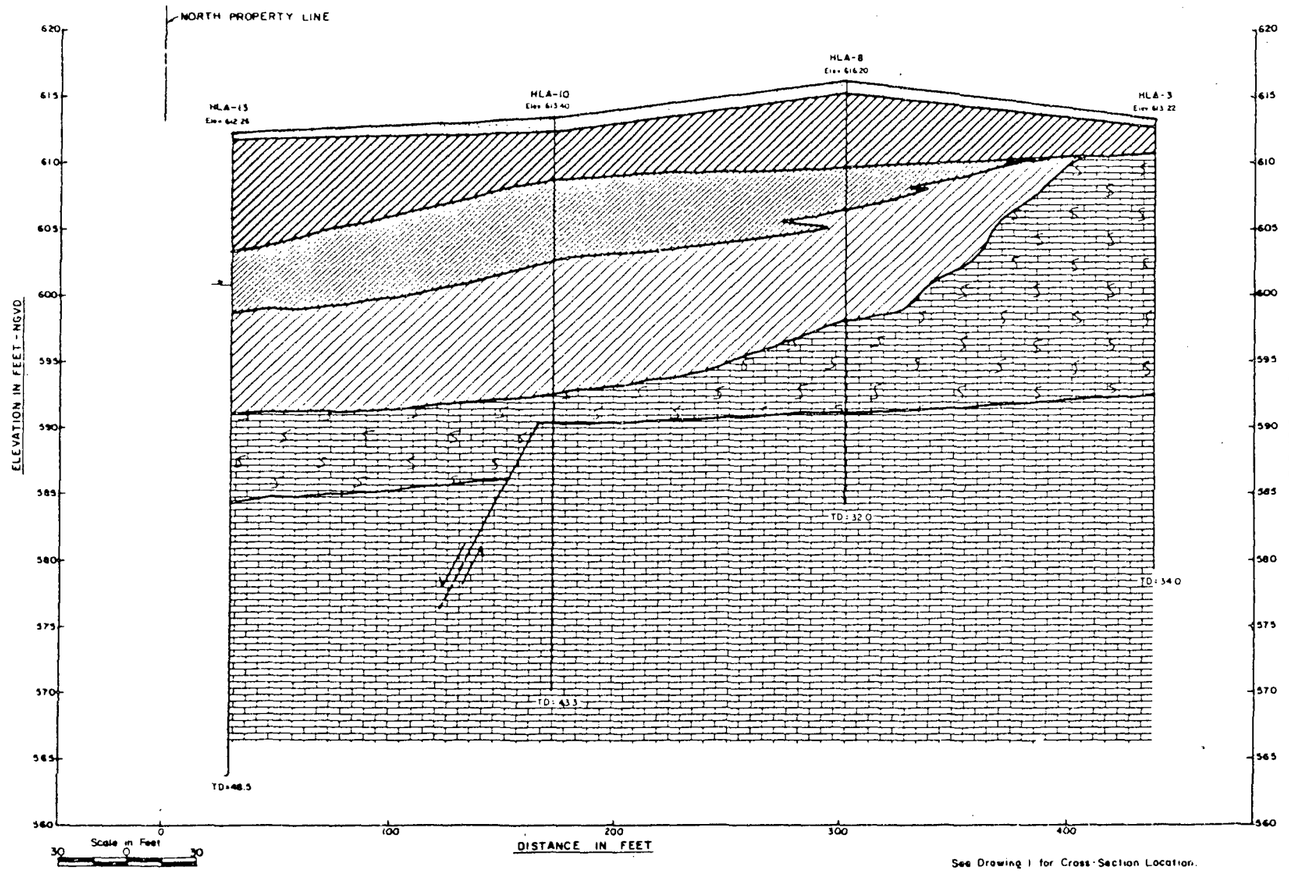
SIGNATURES		DATE
DR.	ENG.	
CH.	EPPR.	

PROJECT NO. 09695, 091.15

SHEET NO. 6 OF 20

REVISIONS	DATE	DESCRIPTION

12:076



See Drawing 1 for Cross-Section Location.

GEOLOGIC CROSS-SECTION D-D'

SCALE: VERT. 1" = 5' HORIZ. 1" = 30'

EXPLANATION

PAVEMENT: Concrete and Cushion Sand

FILL MATERIAL: Dark Gray/Black Clay (CH)

Quaternary

ALLUVIAL DEPOSITS

Brown/Gray Clay (CH-CL)

Light Tan-Brown/Gray Silty Clay (CL)

Upper Cretaceous

LOWER MEMBER AUSTIN CHALK FORMATION

Tan Weathered Chalk

Gray Unweathered Chalk

Inferred Fault
(Arrows indicate Direction of Displacement)

TD = Total Depth of Boring

Water Level
Date of measurement:
GD Logs 9/87
HLA Logs 4/88

Harding Lawson Associates
Engineers Geologists & Geophysicists

Geologic Cross-Section
D-D'

V.W.&R. Dallas Alpha Road Site

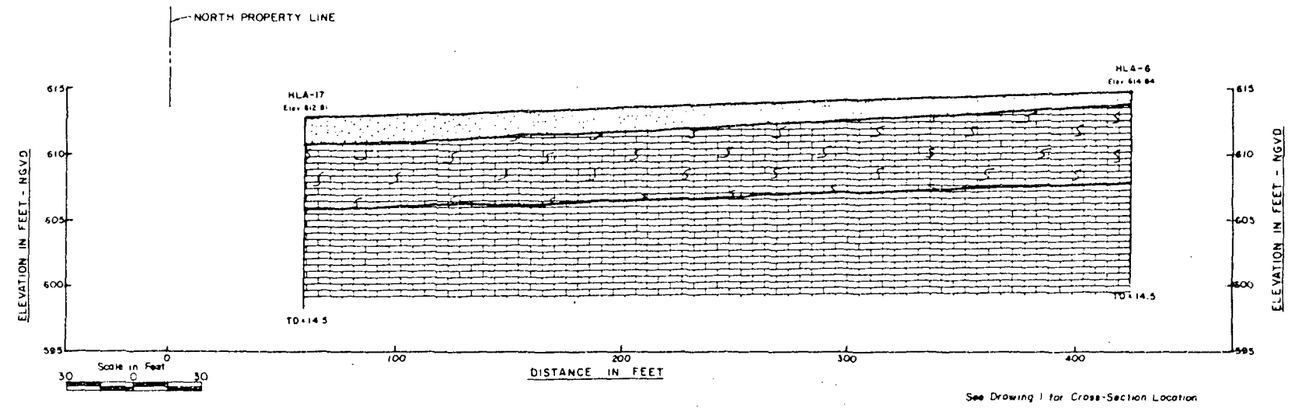
SIGNATURES		DATE
DR.	ENG.	
CH.	APPR.	

PROJECT NO. 09695.091.15

SHEET NO. 7 OF 20

REVISIONS	DATE	DESCRIPTION

12;077



See Drawing 1 for Cross-Section Location

GEOLOGIC CROSS-SECTION E-E'

SCALE: VERT. 1" = 5' HORIZ. 1" = 30'

EXPLANATION

PAVEMENT; Concrete and Cushion Sand

FILL MATERIAL; Dark Gray / Black Clay (CH)

Quaternary

ALLUVIAL DEPOSITS

Brown / Gray Clay (CH-CL)

Light Tan-Brown / Gray Silty Clay (CL)

Upper Cretaceous

LOWER MEMBER AUSTIN CHALK FORMATION

Tan Weathered Chalk

Gray Unweathered Chalk

TD = Total Depth of Boring

Harding Lawson Associates
Engineers Geologists
& Geophysicists

Geologic Cross-Section
E-E'

V.W.&R. Dallas Alpha Road Site

SIGNATURES		DATE
DR.	ENG.	
CH.	APPR.	

PROJECT NO. 09695, 091.15

SHEET NO. 8 OF 20

REVISIONS	DATE	DESCRIPTION

12:078

PROPERTY BOUNDARY

GD-16 ND 1.94 0.198 0.46 | HLA-13 ND 0.07 0.18 0.046 | GD-23 0.352 ND 0.027 ND | HLA-19 | HLA-18 | HLA-16 | HLA-26 | HLA-17

HLA-12 2.52 0.02 0.18 0.156 | HLA-20 | HLA-21 | HLA-14 | GD-21 0.401 ND 0.17 ND | HLA-15

HLA-11 | GD-1 2.7 1.7 0.42 11.0 | GD-2 32.0 2.4 2.1 1.0 | GD-3 0.13 0.012 0.026 0.036 | GD-17 0.477 20.7 22.0 0.16

GD-4 3.5 0.3 0.14 20.0 | GD-5 0.23 0.38 0.8 0.8 | GD-15 ND 0.086 3.5 0.07 | GD-20 0.414 ND 0.094 0.018

GD-22 0.340 ND 0.223 ND

GD-6 0.68 0.06 0.07 0.58 | GD-7 0.11 0.08 0.17 0.046 | GD-14 ND 94.8 141.0 2.8

GD-8 0.15 0.35 0.32 0.10 | GD-9 0.05 1.1 0.018 0.036 | HLA-9

GD-10 0.14 0.03 0.058 0.21 | GD-11 0.063 ND 0.02 0.047 | GD-12 0.09 0.007 0.02 0.038 | HLA-10 19.5 0.8 0.555 17.3

GD-13 ND 11.2 7.6 2.3

HLA-27 | HLA-7

GD-19 0.614 0.014 0.397 0.03 | HLA-8 ND 0.02 0.17 0.201 | GD-18 0.067 0.011 1.48 0.074

HLA-1 | HLA-2 | 22 | HLA-23 | HLA-3 | HLA-4A | HLA-28 | HLA-4 | HLA-25 | HLA-24 | HLA-5 | HLA-6

80 0 80

SCALE IN FEET

EXPLANATION

VOLATILE ORGANIC COMPOUNDS

ACETONE

AROMATICS: ETHYLBENZENE, TOLUENE, XYLENES (TOTAL)

HALOGENATED HYDROCARBANS: METHYLENE CHLORIDE, TETRACHLOROETHENE, 1,2-DICHLOROETHENE (TRANS), 1,1,1-TRICHLOROETHANE, TRICHLOROETHENE

NON-HALOGENATED HYDROCARBONS: METHYL ETHYL KETONE, METHYL ISOBUTYL KETONE

NOTE: EACH LINE (INFERRED) REPRESENTS THE DETECTION LIMIT OF A CHEMICAL CATEGORY.

HLA-10
19.5 ACETONE
0.8 AROMATICS
0.55 HALOGENATED HYDROCARBONS
17.3 NON-HALOGENATED HYDROCARBONS

U D FAULT (INFERRED)
U-UPTHROWN D-DOWNTHROWN
(INDICATES DIRECTION OF DISPLACEMENT)

ND NONE DETECTED. A CHEMICAL COMPOUND IS NOT PRESENT ABOVE DETECTION LIMIT.

NOTE: VALUE SHOWN IS THE MAXIMUM OR SINGLE CHEMICAL CONCENTRATION DETECTED WITHIN THE GROUP OF CHEMICAL COMPOUNDS SELECTED TO REPRESENT A CHEMICAL CATEGORY, EXCLUDING ACETONE.

HARDING LAWSON ASSOCIATES
Engineers, Geologists & Geophysicists

Limits of Detected Volatile Organic Chemical Compounds

Dark Gray/Black Clay Fill

V.W.& R. Dallas Alpha Road Site

SIGNATURES		DATE	PROJECT NO.	SHEET NO.	OF
DR. F.M.	ENG.	1/89	09695,091.15	9	20
CH.	APPR.	2/89			

VWRBOR9

12:079

PROPERTY BOUNDARY

GD-16 770.0 11.4 0.068 2.05 | HLA-13 ND 0.016 0.019 0.092 | GD-23 0.33 0.013 0.029 0.097

GD-1 | GD-2 7.7 ND 0.058 0.6 | GD-3 0.055 ND 0.093 0.031 | GD-4 3.0 ND 0.049 0.5 | GD-5 2.6 0.18 0.71 0.63 | GD-6 1.8 ND 0.076 0.48 | GD-7 0.03 ND 0.023 0.028 | GD-8 0.025 ND 0.025 0.06 | GD-9 0.068 0.052 0.38 0.15 | GD-10 0.052 0.012 0.065 0.045 | GD-11 0.01 ND 0.016 0.024 | GD-12 0.052 ND 0.11 0.10 | GD-13 ND 0.277 0.195 0.804 | GD-14 4,600.0 13.8 142.0 221.0 | GD-15 | GD-17 1.08 3.29 82.6 ND | GD-18 | GD-19 0.066 0.009 0.036 ND | GD-20 0.42 ND 0.17 0.036 | GD-21 0.204 ND 0.10 ND | GD-22

HLA-1 HLA-2 HLA-3 HLA-4 HLA-4A HLA-5 HLA-6 HLA-7 HLA-8 HLA-9 HLA-10 HLA-11 HLA-12 HLA-13 HLA-14 HLA-15 HLA-16 HLA-17 HLA-18 HLA-19 HLA-20 HLA-21 HLA-22 HLA-23 HLA-24 HLA-25 HLA-26 HLA-27 HLA-28

U D

80 0 80

SCALE IN FEET

EXPLANATION

VOLATILE ORGANIC COMPOUNDS

ACETONE

AROMATICS: ETHYLBENZENE, TOLUENE, XYLENES (TOTAL)

HALOGENATED HYDROCARBANS: METHYLENE CHLORIDE, TETRACHLOROETHENE, 1,2-DICHLOROETHENE (TRANS), 1,1,1-TRICHLOROETHANE, TRICHLOROETHENE

NON-HALOGENATED HYDROCARBONS: METHYL ETHYL KETONE, METHYL ISOBUTYL KETONE

NOTE: EACH LINE (INFERRED) REPRESENTS THE DETECTION LIMIT OF A CHEMICAL CATEGORY.

HLA-10
19.5 ACETONE
0.8 AROMATICS
0.55 HALOGENATED HYDROCARBONS
17.3 NON-HALOGENATED HYDROCARBONS

U/D FAULT (INFERRED)
U-UPTHROWN D-DOWNTHROWN
(INDICATES DIRECTION OF DISPLACEMENT)

ND NONE DETECTED. A CHEMICAL COMPOUND IS NOT PRESENT ABOVE DETECTION LIMIT.

NOTE: VALUE SHOWN IS THE MAXIMUM OR SINGLE CHEMICAL CONCENTRATION DETECTED WITHIN THE GROUP OF CHEMICAL COMPOUNDS SELECTED TO REPRESENT A CHEMICAL CATEGORY, EXCLUDING ACETONE.

HARDING LAWSON ASSOCIATES
Engineers, Geologists & Geophysicists

Limits of Detected Volatile Organic Chemical Compounds

Light Tan-Brown/Gray Silty Clay

V.W.& R. Dallas Alpha Road Site

SIGNATURES	DATE	PROJECT NO.	SHEET NO.	OF
DR. F.M.	1/89	09695,091.15	10	20
CH.	6/89			

VWRBOR10

12: 080

PROPERTY BOUNDARY

HLA-13
2.32
8.07
44.3

HLA-12
ND
0.007
0.18
0.553

GD-1
2.4
0.055
0.07
0.8

HLA-9
ND
ND
ND
ND

HLA-7
ND
ND
ND
ND

HLA-8
ND
0.015
0.140
0.05

HLA-10
ND
0.885
1.28
0.8

GD-13
ND
ND
0.102
0.231

GD-15
2.6
27.4
34.6
4.1

GD-20
ND
0.17
0.036

HLA-17
ND
ND
0.017
ND

HLA-5
ND
ND
0.024
ND

HLA-6
ND
ND
ND
ND
ND

80 0 80

SCALE IN FEET

EXPLANATION

VOLATILE ORGANIC COMPOUNDS

ACETONE

AROMATICS: ETHYLBENZENE, TOLUENE, XYLENES (TOTAL)

HALOGENATED HYDROCARBANS: METHYLENE CHLORIDE, TETRACHLOROETHENE, 1,2-DICHLOROETHENE (TRANS), 1,1,1-TRICHLOROETHANE, TRICHLOROETHENE

NON-HALOGENATED HYDROCARBONS: METHYL ETHYL KETONE, METHYL ISOBUTYL KETONE

NOTE: EACH LINE (INFERRED) REPRESENTS THE DETECTION LIMIT OF A CHEMICAL CATEGORY.

HLA-10
19.5 ACETONE
0.8 AROMATICS
0.55 HALOGENATED HYDROCARBONS
17.3 NON-HALOGENATED HYDROCARBONS

U D FAULT (INFERRED)
U-UPTHROWN D-DOWNTHROWN
(INDICATES DIRECTION OF DISPLACEMENT)

ND NONE DETECTED. A CHEMICAL COMPOUND IS NOT PRESENT ABOVE DETECTION LIMIT.

NOTE: VALUE SHOWN IS THE MAXIMUM OR SINGLE CHEMICAL CONCENTRATION DETECTED WITHIN THE GROUP OF CHEMICAL COMPOUNDS SELECTED TO REPRESENT A CHEMICAL CATEGORY, EXCLUDING ACETONE.

HARDING LAWSON ASSOCIATES
Engineers, Geologists & Geophysicists

Limits of Detected Volatile Organic Chemical Compounds

Tan Weathered Chalk

V.W.& R. Dallas Alpha Road Site

SIGNATURES		DATE	PROJECT NO.	SHEET NO.	OF
DR. F.M.	CHK.	1/89	09695,091.15	11	20
DL.	APP.	6/89			

vwrbor11

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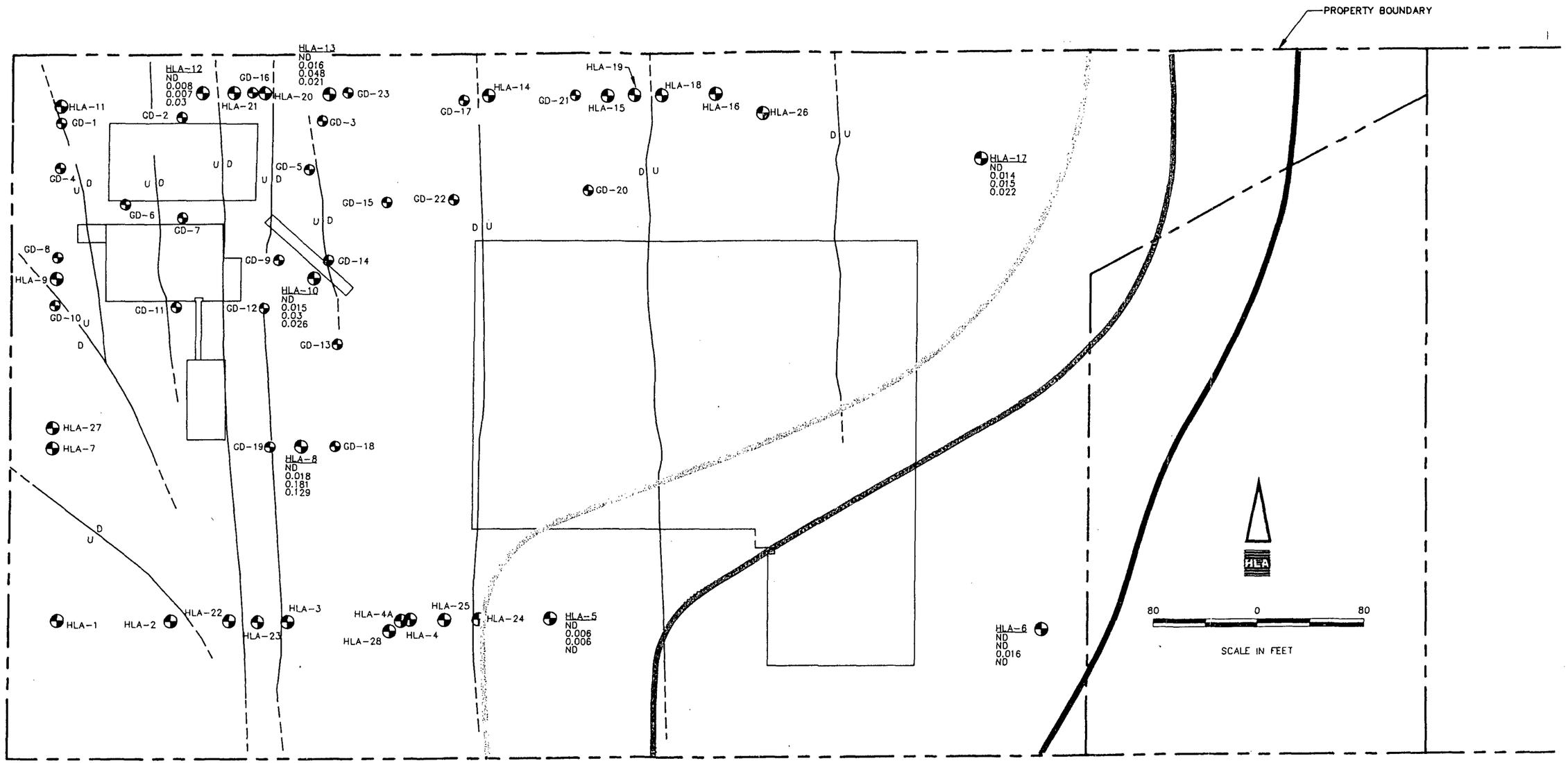


EXPLANATION

VOLATILE ORGANIC COMPOUNDS

ACETONE

AROMATICS: ETHYLBENZENE, TOLUENE, XYLENES (TOTAL)

HALOGENATED HYDROCARBANS: METHYLENE CHLORIDE, TETRACHLOROETHENE, 1,2-DICHLOROETHENE (TRANS), 1,1,1-TRICHLOROETHANE, TRICHLOROETHENE

NON-HALOGENATED HYDROCARBONS: METHYL ETHYL KETONE, METHYL ISOBUTYL KETONE

NOTE: EACH LINE (INFERRED) REPRESENTS THE DETECTION LIMIT OF A CHEMICAL CATEGORY.

HLA-10
19.5 ACETONE
0.8 AROMATICS
0.55 HALOGENATED HYDROCARBONS
17.3 NON-HALOGENATED HYDROCARBONS

U / D FAULT (INFERRED)
U-UPTHROWN D-DOWNTHROWN
(INDICATES DIRECTION OF DISPLACEMENT)

ND NONE DETECTED. A CHEMICAL COMPOUND IS NOT PRESENT ABOVE DETECTION LIMIT.

NOTE: VALUE SHOWN IS THE MAXIMUM OR SINGLE CHEMICAL CONCENTRATION DETECTED WITHIN THE GROUP OF CHEMICAL COMPOUNDS SELECTED TO REPRESENT A CHEMICAL CATEGORY, EXCLUDING ACETONE.

HARDING LAWSON ASSOCIATES
Engineers, Geologists & Geophysicists

Limits of Detected Volatile Organic Chemical Compounds

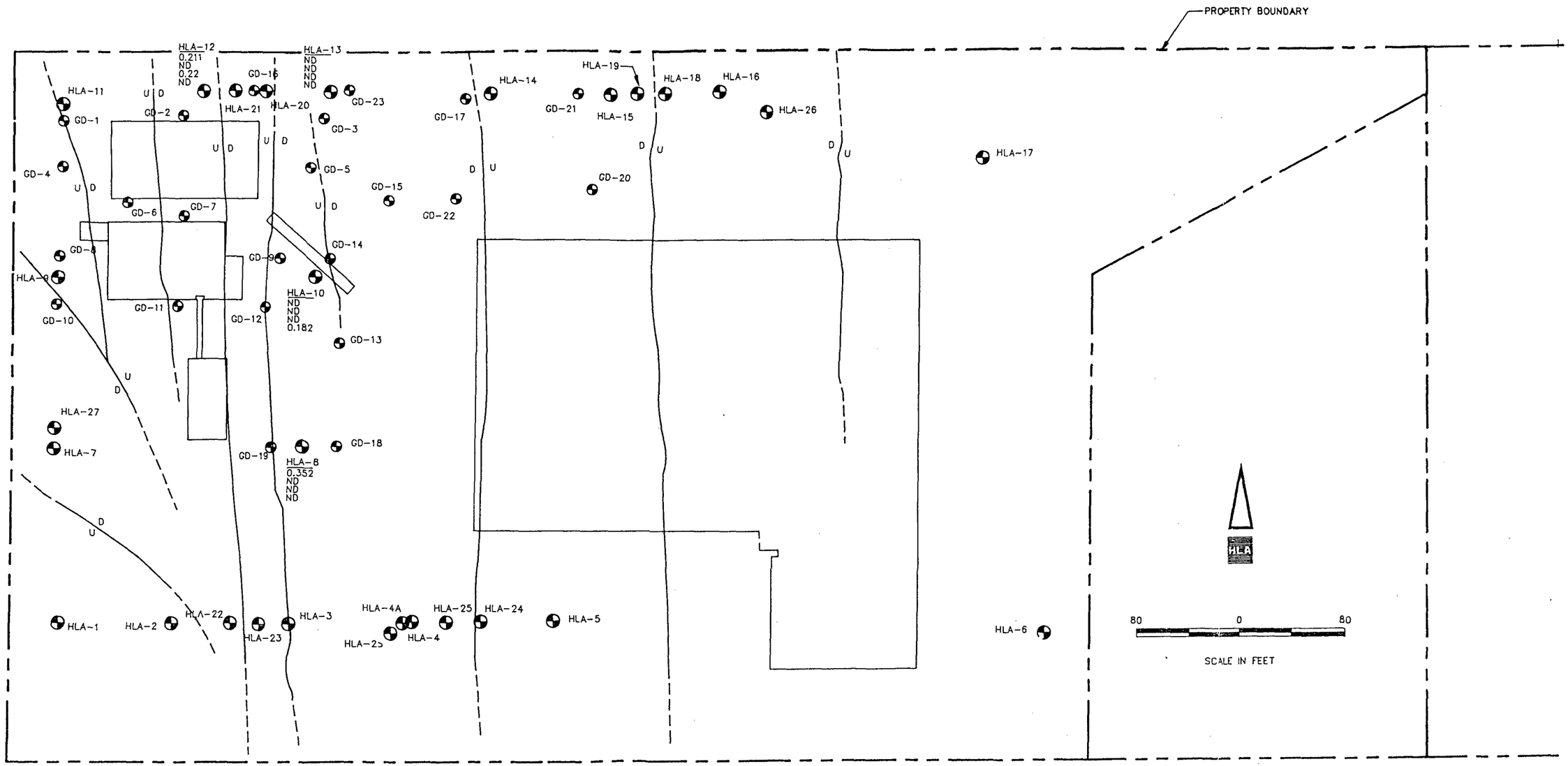
Gray Unweathered Chalk

V.W.& R. Dallas Alpha Road Site

SIGNATURES		DATE	PROJECT NO.	SHEET NO.	OF
DR. F.M.	DNR.	1/89	09695,091.15	12	20
CH.	APP.	4/89			

vwrbor12

12:082



EXPLANATION

SEMI-VOLATILE ORGANIC COMPOUNDS

PHTHALATES: BIS (2-ETHYLHEXYL) PHTHALATE, DI-N-BUTYLPHTHALATE, DI-N-OCTYLPHTHALATE

HALOGENATED HYDROCARBONS: 1,2-DICHLOROBENZENE, 1,3-DICHLOROBENZENE, 1,4-DICHLOROBENZENE

POLYNUCLEAR AROMATIC HYDROCARBONS: NAPTHALENE

PHENOLS: PHENOL

HLA-10
0.211 PHTHALATES
ND HALOGENATED HYDROCARBONS
0.22 POLYNUCLEAR AROMATIC HYDROCARBONS
ND PHENOLS

U / D — FAULT (INFERRED)
U-UPTHROWN D-DOWNTHROWN
(INDICATES DIRECTION OF DISPLACEMENT)

ND NONE DETECTED. A CHEMICAL COMPOUND IS NOT PRESENT ABOVE DETECTION LIMIT.

NOTE: VALUE SHOWN IS THE MAXIMUM OR SINGLE CHEMICAL CONCENTRATION DETECTED WITHIN THE GROUP OF CHEMICAL COMPOUNDS SELECTED TO REPRESENT A CHEMICAL CATEGORY.

HARDING LAWSON ASSOCIATES
Engineers, Geologists & Geophysicists

Detected Concentrations of Semi-Volatile Organic Chemical Compounds

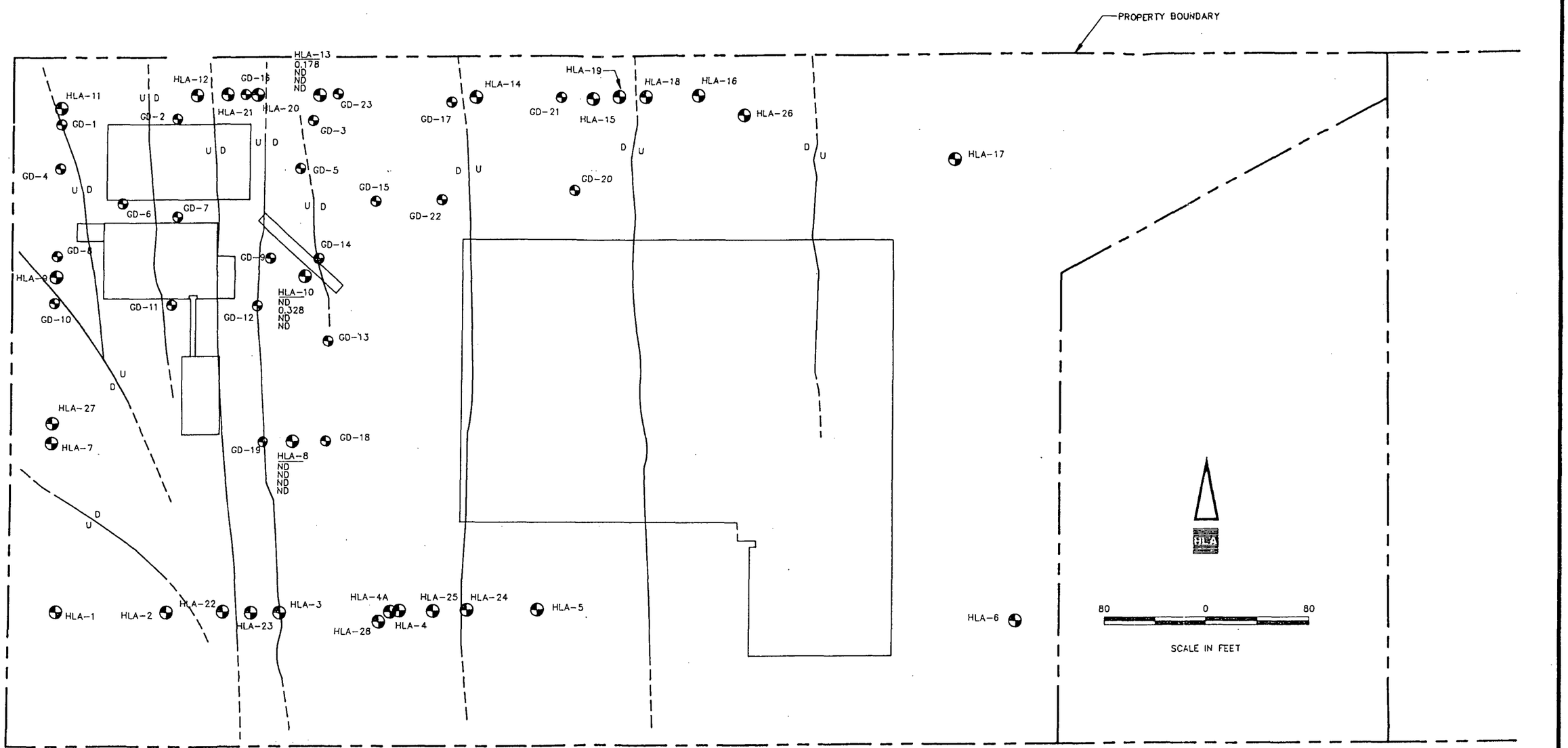
Dark Gray/Black Clay Fill

V.W. & R. Dallas Alpha Road Site

SIGNATURES	DATE	PROJECT NO.	SHEET NO.	OF
DR. F.M. DWG APP.	1/90	09695,091.15	13	20

VWRBOR13

12:083



EXPLANATION

SEMI-VOLATILE ORGANIC COMPOUNDS

PHTHALATES: BIS (2-ETHYLHEXYL) PHTHALATE, DI-N-BUTYLPHTHALATE, DI-N-OCTYLPHTHALATE

HALOGENATED HYDROCARBONS: 1,2-DICHLOROBENZENE, 1,3-DICHLOROBENZENE, 1,4-DICHLOROBENZENE

POLYNUCLEAR AROMATIC HYDROCARBONS: NAPTHALENE

PHENOLS: PHENOL

HLA-10
0.211 PHTHALATES
ND HALOGENATED HYDROCARBONS
0.22 POLYNUCLEAR AROMATIC HYDROCARBONS
ND PHENOLS

U / D — FAULT (INFERRED)
U-UPTHROWN D-DOWNTHROWN
(INDICATES DIRECTION OF DISPLACEMENT)

ND NONE DETECTED. A CHEMICAL COMPOUND IS NOT PRESENT ABOVE DETECTION LIMIT.

NOTE: VALUE SHOWN IS THE MAXIMUM OR SINGLE CHEMICAL CONCENTRATION DETECTED WITHIN THE GROUP OF CHEMICAL COMPOUNDS SELECTED TO REPRESENT A CHEMICAL CATEGORY.

HARDING LAWSON ASSOCIATES
Engineers, Geologists & Geophysicists

Detected Concentrations of Semi-Volatile Organic Chemical Compounds
Light Tan-Brown/Gray Silty Clay
V.W. & R. Dallas Alpha Road Site

SIGNATURES	DATE	PROJECT NO.	SHEET NO.	OF
DR. FJL DES.	1/89	09695,091.15	14	20
CH.	1/89			

vwrbor14

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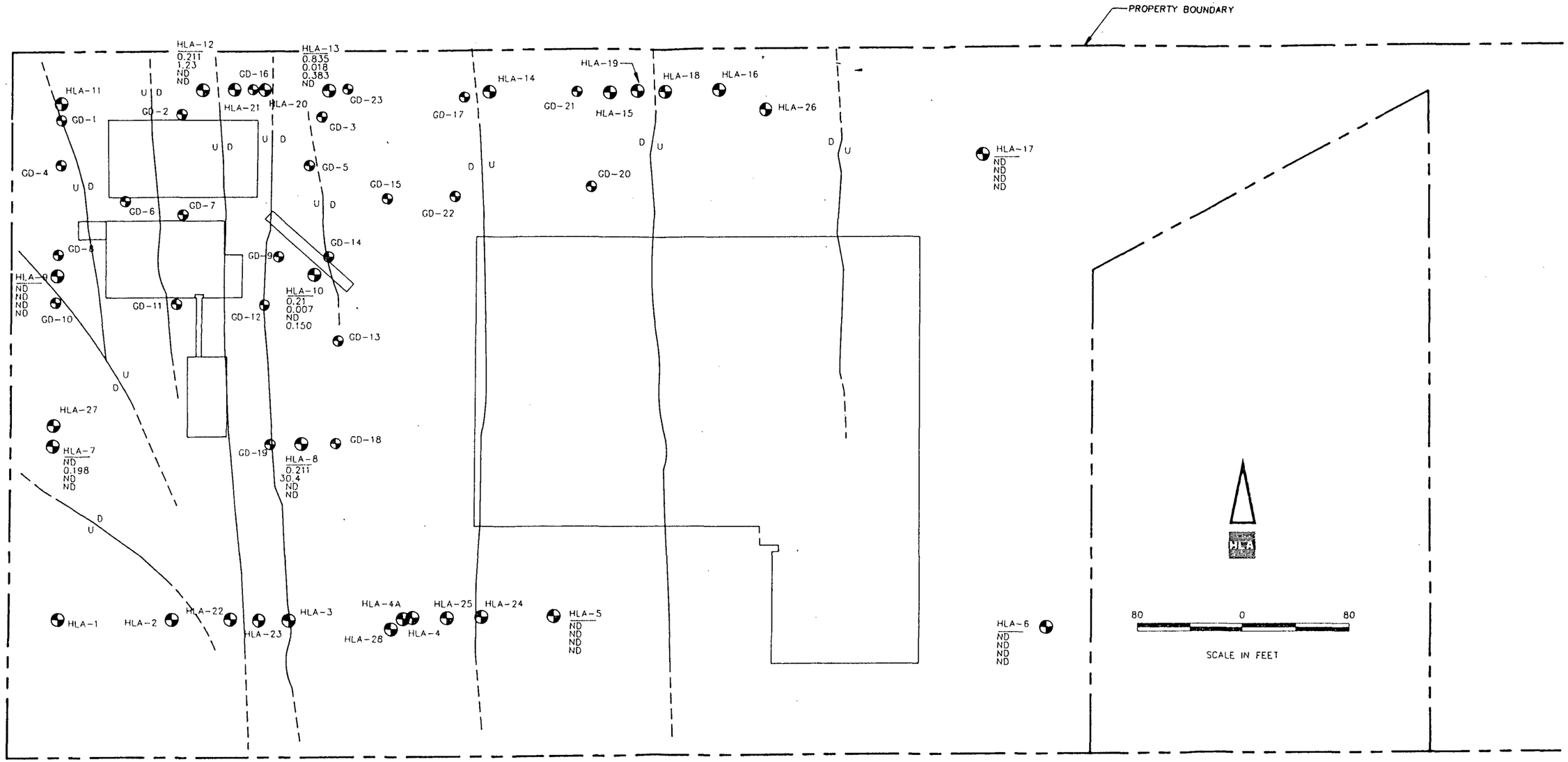

EXPLANATION

SEMI-VOLATILE ORGANIC COMPOUNDS

PHTHALATES: BIS (2-ETHYLHEXYL) PHTHALATE, DI-N-BUTYLPHTHALATE, DI-N-OCTYLPHTHALATE

HALOGENATED HYDROCARBONS: 1,2-DICHLOROBENZENE, 1,3-DICHLOROBENZENE, 1,4-DICHLOROBENZENE

POLYNUCLEAR AROMATIC HYDROCARBONS: NAPTHALENE

PHENOLS: PHENOL

HLA-10
0.211 PHTHALATES
ND HALOGENATED HYDROCARBONS
0.22 POLYNUCLEAR AROMATIC HYDROCARBONS
ND PHENOLS

U
D
FAULT (INFERRED)
U-UPTHROWN D-DOWNTHROWN
(INDICATES DIRECTION OF DISPLACEMENT)

ND NONE DETECTED. A CHEMICAL COMPOUND IS NOT PRESENT ABOVE DETECTION LIMIT.

NOTE: VALUE SHOWN IS THE MAXIMUM OR SINGLE CHEMICAL CONCENTRATION DETECTED WITHIN THE GROUP OF CHEMICAL COMPOUNDS SELECTED TO REPRESENT A CHEMICAL CATEGORY.

HARDING LAWSON ASSOCIATES
Engineers, Geologists & Geophysicists

Detected Concentrations of Semi-Volatile Organic Chemical Compounds
Tan Weathered Chalk
V.W. & R. Dallas Alpha Road Site

SIGNATURES		DATE	PROJECT NO.	SHEET NO.	OF
DR. F.M.	CHK.	1/89	09695,091.15	15	20
CH.	APPR.				

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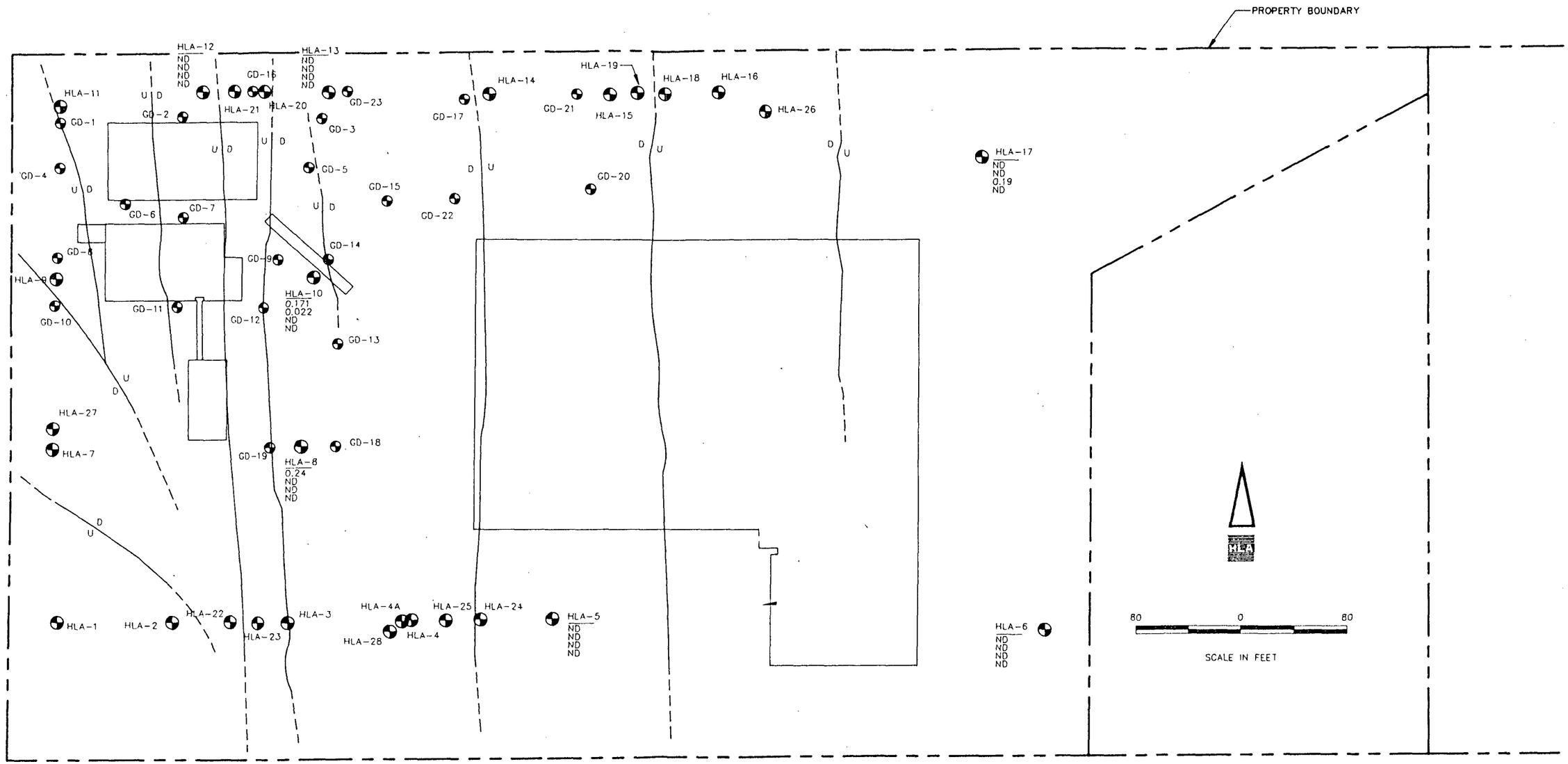
12:085



EXPLANATION

SEMI-VOLATILE ORGANIC COMPOUNDS

PHTHALATES: BIS (2-ETHYLHEXYL) PHTHALATE, DI-N-BUTYLPHTHALATE, DI-N-OCTYLPHTHALATE

HALOGENATED HYDROCARBONS: 1,2-DICHLOROBENZENE, 1,3-DICHLOROBENZENE, 1,4-DICHLOROBENZENE

POLYNUCLEAR AROMATIC HYDROCARBONS: NAPTHALENE

PHENOLS: PHENOL

HLA-10
0.211 PHTHALATES
ND HALOGENATED HYDROCARBONS
0.22 POLYNUCLEAR AROMATIC HYDROCARBONS
ND PHENOLS

U / D — FAULT (INFERRED)
U-UPTHROWN D-DOWNTHROWN
(INDICATES DIRECTION OF DISPLACEMENT)

ND NONE DETECTED. A CHEMICAL COMPOUND IS NOT PRESENT ABOVE DETECTION LIMIT.

NOTE: VALUE SHOWN IS THE MAXIMUM OR SINGLE CHEMICAL CONCENTRATION DETECTED WITHIN THE GROUP OF CHEMICAL COMPOUNDS SELECTED TO REPRESENT A CHEMICAL CATEGORY.

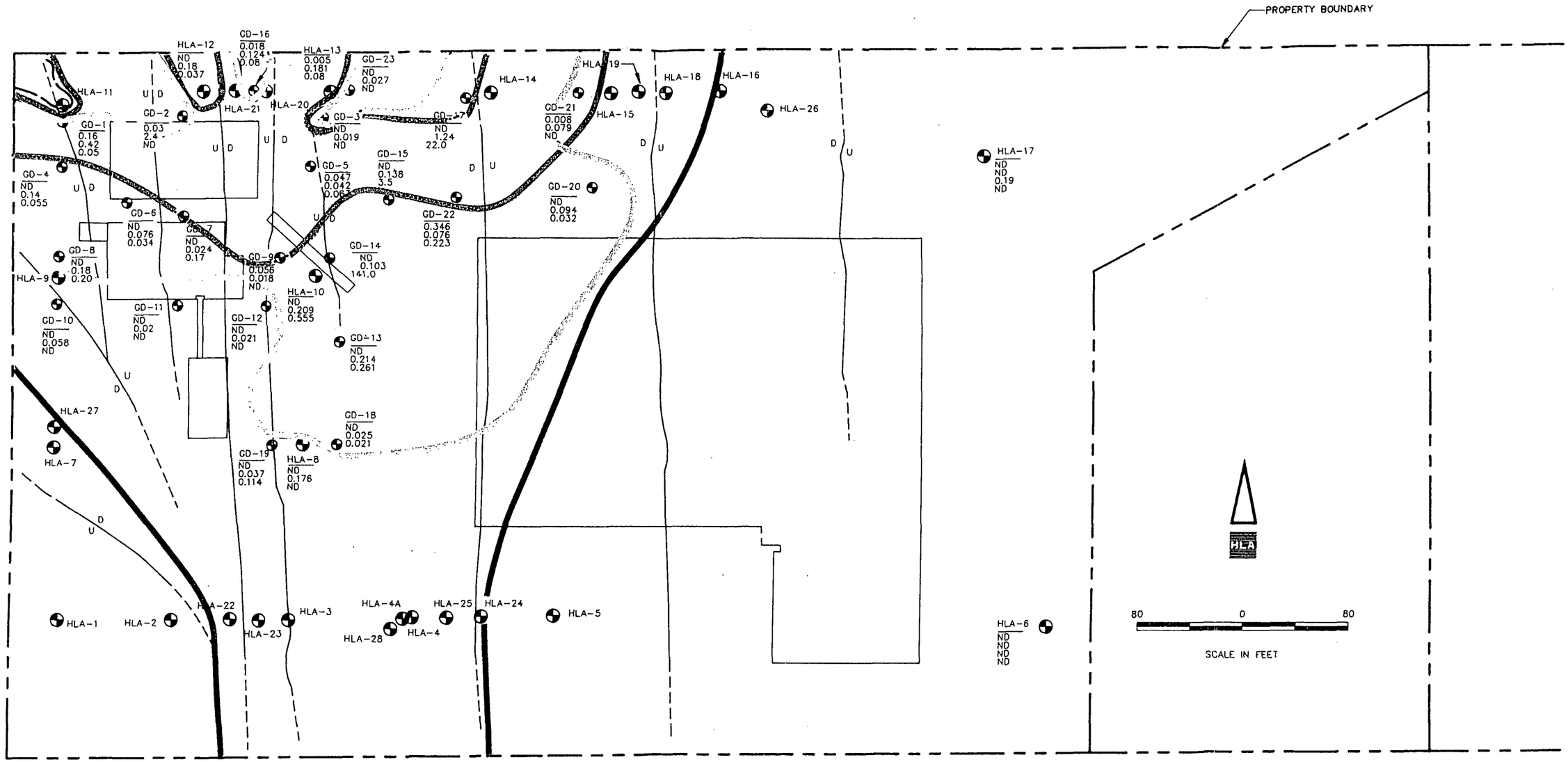
HARDING LAWSON ASSOCIATES
Engineers, Geologists & Geophysicists

Detected Concentrations of Semi-Volatile Organic Chemical Compounds
Gray Unweathered Chalk
V.W. & R. Dallas Alpha Road Site

SIGNATURES		DATE	PROJECT NO.	SHEET NO.	OF
DR. F.M.	CHK.	1/90	09695,091.15	16	20
QA	APPR.				

vwrbar16

12:086



EXPLANATION

CARCINOGENS

CLASS A: BENZENE, VINYL CHLORIDE

CLASS B: CHLOROFORM, 1, 2-DICHLOROETHANE, 1, 2-DIPHENYLHYDRAZINE, METHYLENE CHLORIDE, TRICHLOROETHENE

CLASS C: 1, 1-DICHLOROETHENE, TETRACHLOROETHENE

NOTE: EACH LINE (INFERRED) REPRESENTS THE DETECTION LIMIT OF A CARCINOGEN CLASS.

HLA-10
ND Class A
0.209 Class B
0.555 Class C

U / D — FAULT (INFERRED)
U-UPTHROWN D-DOWNTHROWN
(INDICATES DIRECTION OF DISPLACEMENT)

ND NONE DETECTED. A CHEMICAL COMPOUND IS NOT PRESENT ABOVE DETECTION LIMIT.

NOTE: VALUE SHOWN IS THE MAXIMUM OR SINGLE CHEMICAL CONCENTRATION DETECTED WITHIN THE GROUP OF CHEMICAL COMPOUNDS SELECTED TO REPRESENT EACH CLASS OF CARCINOGENS.

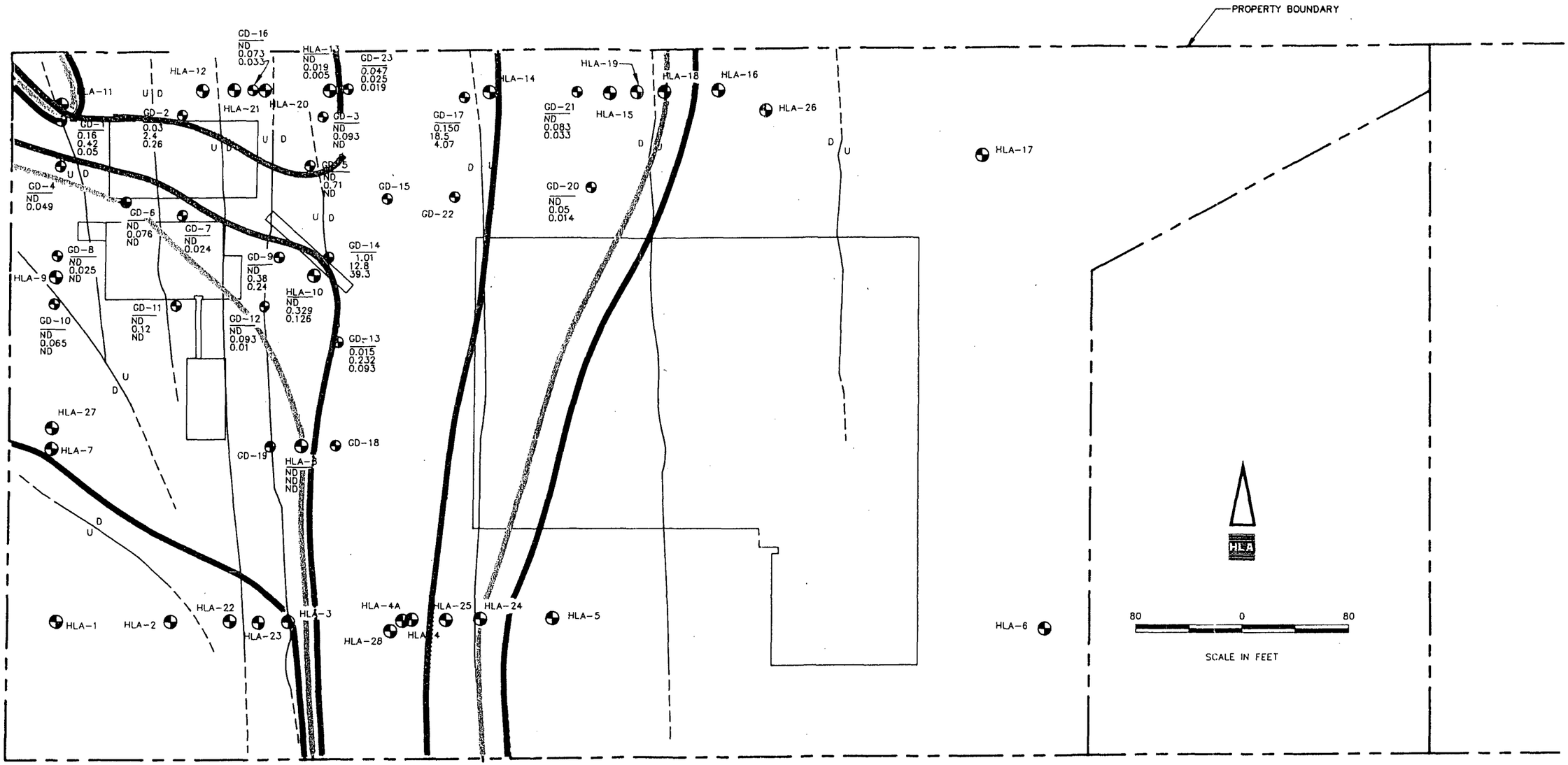
HARDING LAWSON ASSOCIATES
Engineers, Geologists & Geophysicists

Limits of Detected Carcinogenic Organic Chemical Compounds
Dark Gray / Black Clay Fill
V.W. & R. Dallas Alpha Road Site

SIGNATURES		DATE	PROJECT NO.	SHEET NO.	OF
DR. F.M.	CHK.	1/88	09695,091.15	17	20
DR.	APP.				

VWRBOR17

12:087



EXPLANATION

CARCINOGENS

CLASS A: BENZENE, VINYL CHLORIDE

CLASS B: CHLOROFORM, 1, 2-DICHLOROETHANE, 1, 2-DIPHENYLHYDRAZINE, METHYLENE CHLORIDE, TRICHLOROETHENE

CLASS C: 1, 1-DICHLOROETHENE, TETRACHLOROETHENE

NOTE: EACH LINE (INFERRED) REPRESENTS THE DETECTION LIMIT OF A CARCINOGEN CLASS.

HLA-10
ND Class A
0.209 Class B
0.555 Class C

U / D FAULT (INFERRED)
U-UPTHROWN D-DOWNTHROWN
(INDICATES DIRECTION OF DISPLACEMENT)

ND NONE DETECTED. A CHEMICAL COMPOUND IS NOT PRESENT ABOVE DETECTION LIMIT.

NOTE: VALUE SHOWN IS THE MAXIMUM OR SINGLE CHEMICAL CONCENTRATION DETECTED WITHIN THE GROUP OF CHEMICAL COMPOUNDS SELECTED TO REPRESENT EACH CLASS OF CARCINOGENS.

HARDING LAWSON ASSOCIATES
Engineers, Geologists & Geophysicists

Limits of Detected Carcinogenic Organic Chemical Compounds
Light Tan – Brown / Gray Silty Clay
V.W. & R. Dallas Alpha Road Sits

SIGNATURES	DATE	PROJECT NO.	SHEET NO.	OF
DR. F.M. DES.	1/88	09695,091.15	18	20
CH. APPR.	1/88			

VWRBOR18

PROPERTY BOUNDARY

HLA-1 HLA-2 HLA-22 HLA-23 HLA-3 HLA-4A HLA-28 HLA-4 HLA-25 HLA-24 HLA-5 ND ND ND HLA-6 ND ND ND HLA-7 ND ND ND HLA-8 ND 0.018 0.140 HLA-9 ND ND ND HLA-10 0.209 0.555 HLA-11 HLA-12 ND 0.180 ND HLA-13 0.155 5.21 2.74 HLA-14 HLA-15 HLA-16 HLA-17 ND ND ND HLA-18 HLA-19 HLA-20 HLA-21 HLA-26 HLA-27 HLA-30 0.014 3.28 0.251

GD-1 GD-2 GD-3 GD-4 GD-5 GD-6 GD-7 GD-8 GD-9 GD-10 GD-11 GD-12 GD-13 0.015 0.163 0.093 GD-14 GD-15 ND 1.63 34.6 GD-16 GD-17 GD-18 GD-19 GD-20 GD-21 GD-22 GD-23

U D

D U

80 0 80

SCALE IN FEET

EXPLANATION

CARCINOGENS

CLASS A: BENZENE, VINYL CHLORIDE

CLASS B: CHLOROFORM, 1, 2-DICHLOROETHANE, 1, 2-DIPHENYLHYDRAZINE, METHYLENE CHLORIDE, TRICHLOROETHENE

CLASS C: 1, 1-DICHLOROETHENE, TETRACHLOROETHENE

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0.209 Class B
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U-UPTHROWN D-DOWNTHROWN
(INDICATES DIRECTION OF DISPLACEMENT)

ND NONE DETECTED. A CHEMICAL COMPOUND IS NOT PRESENT ABOVE DETECTION LIMIT.

NOTE: VALUE SHOWN IS THE MAXIMUM OR SINGLE CHEMICAL CONCENTRATION DETECTED WITHIN THE GROUP OF CHEMICAL COMPOUNDS SELECTED TO REPRESENT EACH CLASS OF CARCINOGENS.

HLA

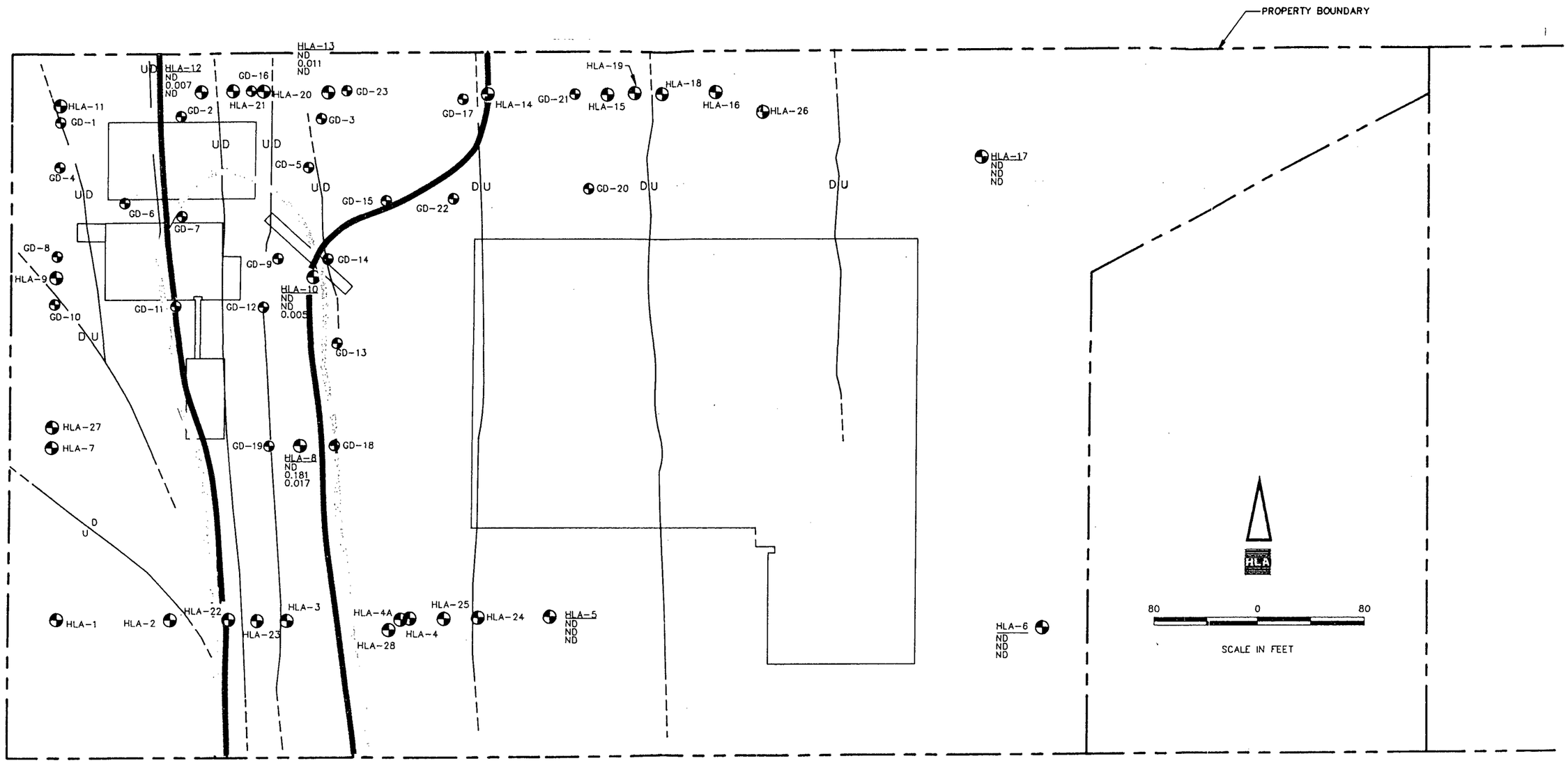
HARDING LAWSON ASSOCIATES
Engineers, Geologists & Geophysicists

SIGNATURES DATE

DR. F.M. 1/88

CH.

12:089



EXPLANATION

CARCINOGENS

CLASS A: BENZENE, VINYL CHLORIDE

CLASS B: CHLOROFORM, 1, 2–DICHLOROETHANE, 1, 2–DIPHENYLHYDRAZINE, METHYLENE CHLORIDE, TRICHLOROETHENE

CLASS C: 1, 1–DICHLOROETHENE, TETRACHLOROETHENE

NOTE: EACH LINE (INFERRED) REPRESENTS THE DETECTION LIMIT OF A CARCINOGEN CLASS.

HLA-10
ND Class A
0.209 Class B
0.555 Class C

U
D
FAULT (INFERRED)
U–UPTHROWN D–DOWNTHROWN
(INDICATES DIRECTION OF DISPLACEMENT)

ND NONE DETECTED. A CHEMICAL COMPOUND IS NOT PRESENT ABOVE DETECTION LIMIT.

NOTE: VALUE SHOWN IS THE MAXIMUM OR SINGLE CHEMICAL CONCENTRATION DETECTED WITHIN THE GROUP OF CHEMICAL COMPOUNDS SELECTED TO REPRESENT EACH CLASS OF CARCINOGENS.

HARDING LAWSON ASSOCIATES
Engineers, Geologists & Geophysicists

Limits of Detected Carcinogenic Organic Chemical Compounds

Gray Unweathered Chalk

V.W.& R. Dallas Alpha Road Site

SIGNATURES	DATE	PROJECT NO.	SHEET NO.	OF
DR. F.M. DES. CH. APP.	1/89 2/89	09695,091.15	20	20

vwrbor20

12;090

APPENDIX A

ECOVA CORPORATION LOGS OF BORINGS

ECOVA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 873016	PROJECT NAME: VWR - DALLAS		
BORING NUMBER: B1 · (GD-1)	COORDINATES:		DATE: 4/8/87
ELEVATION: 610.13	GWL: Depth	Date/Time	DATE STARTED: 4/8/87
ENGINEER/GEOLOGIST: R. HAMLET RH	Depth	Date/Time	DATE COMPLETED: 4/8/87
DRILLING METHODS: HOLLOW STEM AUGERS			PAGE 1 OF 1

DEPTH (ft)	SAMPLE TYPE/NO.	BLOWS ON SAMPLER PER ( )	RECOVERY (inch)	DESCRIPTION	USCS SYMBOL	SOIL PROFILE	WELL CONSTUCTION	REMARKS
	VWRD 2023			CONCRETE SAND/CLAY SUBGRADE V. Stiff, Black, Highly Plastic Clay w/Some Limey Clay	FILL			No Water
	VWRD 2024		3.5"	Stiff, LT. Tan, Med Plastic, Limey Clay w/LS Particles & Pebbles.	CL			Strong Odors
5				T.D. 4' - 3½" on Rock Weathered Platey LS CONTAMINATED				
10								
15								
20								

NOTES:

DRILLERS: Southwest Labs

12:092

ECOVA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 873016	PROJECT NAME: VWR - DALLAS		
BORING NUMBER: B-2 (GD-2)	COORDINATES:		DATE: 4/8/87
ELEVATION: 612.05	GWL: Depth	Date/Time	DATE STARTED: 4/8/87
ENGINEER/GEOLOGIST: R. HAMLET RH	Depth	Date/Time	DATE COMPLETED: 4/8/87
DRILLING METHODS: HOLLOW STEM AUGERS			PAGE 1 OF 1

DEPTH (ft)	SAMPLE TYPE/NO.	BLOWS ON SAMPLER PER (6 inch)	RECOVERY (inch)	DESCRIPTION	USCS SYMBOL	SOIL PROFILE	WELL CONSTUCTION	REMARKS
	VWRD 2020			CONCRETE SAND/CLAY SUBGRADE V. Stiff, Black, Highly Plastic Clay w/Organics, Wood & Gravels	FILL			
5	VWRD 2021		8"	LS, LT. Tan, Weathered But Solid	LS			Strong Odors
				Stiff, LT. Tan, Limey Clay	CL			
	VWRD 2022		24	LS, Weathered Stiff, LT. Tan, Med. Plastic, Limey Clay	LS CL			Dry Hole
10				TD 8:2' in Solid Rock Weathered, Platey Limestone Contaminated				
15								
20								

NOTES:

DRILLERS: Southwest Labs

12:093

ECOVA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 873016	PROJECT NAME: VWR - DALLAS	
BORING NUMBER: B-3 (GD-3)	COORDINATES:	DATE: 4/7/87
ELEVATION: 612.93	GWL: Depth / Date/Time	DATE STARTED: 4/7/87
ENGINEER/GEOLOGIST: HAMLET	Depth / Date/Time	DATE COMPLETED: 4/7/87
DRILLING METHODS: HOLLOW STEM AUGERS		PAGE 1 OF 1

DEPTH (ft)	SAMPLE TYPE/NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (inch)	DESCRIPTION	USCS SYMBOL	SOIL PROFILE	WELL CONSTUCTION	REMARKS
				CONCRETE	FILL			
				SAND/CLAY SUBGRADE				
	VWRD 2008			Very Stiff, Black, Highly Plastic Clay Fill w/Organics LS. Debris				
5	VWRD 2009	20 13 11	3"		FILL			Strong Odors of Organic Compounds
	VWRD 2010	20 21 17	8"					
10								Static Water Level
	VWRD 2011	10 9 8	5"	Soft, Altered LS to Clay, LT. Tan, Med/Low Plastic, Limey w/LS Fragments.	CL			Water Level ATD & Top of Water Lense.
15				T.D. 15' CONTAMINATED				
20								

NOTES:

DRILLERS: Southwest Labs

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ECOVA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 873016	PROJECT NAME: VWR - DALLAS		
BORING NUMBER: B-4 (GD-4)	COORDINATES:		DATE: 4/8/87
ELEVATION: 610.85	GWL: Depth	Date/Time	DATE STARTED:
ENGINEER/GEOLOGIST: R. HAMLET	Depth	Date/Time	DATE COMPLETED: 4/8/87
DRILLING METHODS: HOLLOW STEM AUGERS			PAGE 1 OF 1

DEPTH (ft)	SAMPLE TYPE/NO.	BLOWS ON SAMPLER PER ( )	RECOVERY (inch)	DESCRIPTION	USCS SYMBOL	SOIL PROFILE	WELL CONSTUCTION	REMARKS
	VWRD 2025			CONCRETE SAND/CLAY SUBGRADE V.Stiff, Black, Highly Plastic Clay	FILL			
	VWRD 2026	50 12 in		Stiff, LT. Tan, Low Plastic, Limey, Clay w/Platey LS at Bottom . T.D. 4' - 2" on Rock Weathered, Platey Limestone Contaminated	CL			Strong Odors No Water
5								
10								
15								
20								

NOTES:

DRILLERS: Southwest Labs

12:095

ECOVA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 873016	PROJECT NAME: VWR - DALLAS		
BORING NUMBER: B-5 (GD-5)	COORDINATES:		DATE: 4/8/87
ELEVATION: 613.22	GWL: Depth 9.75	Date/Time 4/9 10:20	DATE STARTED: 4/8/87
ENGINEER/GEOLOGIST: R. HAMLET RH	Depth 9.75	Date/Time 4/10 2:00	DATE COMPLETED: 4/8/87
DRILLING METHODS: HOLLOW STEM AUGERS			PAGE 1 OF 1

DEPTH (ft)	SAMPLE TYPE/NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (inch)	DESCRIPTION	USCS SYMBOL	SOIL PROFILE	WELL CONSTUCTION	REMARKS
				CONCRETE				
	VWRD 2015			SAND/CLAY SUBGRADE V. Stiff, Black, Highly Plastic, Clay w/Organics, Wood & Gravels	FILL			
5	VWRD 2016	11 12 9	7"					
	VWRD 2017	13 14 13	8"	Large % of Limestone Pieces				Extremely Strong Odor In Samples 9.75' Static Water Level.
10								
	VWRD 2018	9 13 13	12"	Firm to Stiff, LT. Tan, Med. Plastic, Limey Clay w/LS. Grains & Pieces	CL			
15								
	VWRD 2019		9"	Strong Organic Odors				Water Level ATD & Top of Water Lense
				T.D 17½' CONTAMINATED				
20								

NOTES:
DRILLERS: Southwest Labs

12:096

ECOVA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 873016	PROJECT NAME: VKR - DALLAS		
BORING NUMBER: B-6 (GD-6)	COORDINATES:		DATE: 4/8/87
ELEVATION: 613.17	GWL: Depth 1.87 Date/Time 4/9 10:20		DATE STARTED:
ENGINEER/GEOLOGIST: R. HAMLET RH	Depth 1.85 Date/Time 4/10 2:00		DATE COMPLETED: 4/8/87
DRILLING METHODS: HOLLOW STEM AUGERS			PAGE 1 OF 1

DEPTH (ft)	SAMPLE TYPE/NO.	BLOWS ON SAMPLER PER ( )	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	SOIL PROFILE	WELL CONSTUCTION	REMARKS
	VWRD 2036			CONCRETE Dense, Black, Gravels & Cinders Contaminated w/Hydrocarbons	FILL			▼ Water Level And Hydrocarbons In Water
5	VWRD 2037			Stiff, Lt.Tan, Med Plastic, Limey Clay T.D. 5' - 5" On Rock Weathered, Platey LS Contaminated	CL			
10								
15								
20								

NOTES:

DRILLERS: Southwest Labs

12:097

ECOVA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 873016	PROJECT NAME: VWR - DALLAS		
BORING NUMBER: B-7 (GD-7)	COORDINATES:		DATE: 4/8/87
ELEVATION: 613.14	GWL: Depth	Date/Time	DATE STARTED:
ENGINEER/GEOLOGIST: R. HAMLET RH	Depth	Date/Time	DATE COMPLETED: 4/8/87
DRILLING METHODS: HOLLOW STEM AUGERS			PAGE 1 OF 1

DEPTH (ft)	SAMPLE TYPE/NO.	BLOWS ON SAMPLER PER ( )	RECOVERY (inch)	DESCRIPTION	USCS SYMBOL	SOIL PROFILE	WELL CONSTUCTION	REMARKS
	VWRD 2033			CONCRETE SAND/CLAY SUBGRADE V.Stiff, Black, Highly Plastic Clay w/Organics & Gravels	FILL FILL			
5	VWRD 2034	14 28 30	8"	Firm to Stiff, Lt.Tan, Med.Plastic, Limey Clay w/Highly Weathered to Decomposed LS.	CL			Strong Odors No Water
	VWRD 2035	50 12.5"	6"					
10				T.D. 8' - 6" On Rock Weathered, Platey Rock Contaminated				
15								
20								

NOTES:

DRILLERS: Southwest Labs

12:098

ECOVA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 873016	PROJECT NAME: VWR - DALLAS	
BORING NUMBER: B-8 (GD-8)	COORDINATES:	DATE: 4/8/87
ELEVATION: 611.20	GWL: Depth / Date/Time	DATE STARTED:
ENGINEER/GEOLOGIST: R. HAMLET RH	Depth / Date/Time	DATE COMPLETED: 4/8/87
DRILLING METHODS: HOLLOW-STEM AUGERS		PAGE 1 OF 1

DEPTH (ft)	SAMPLE TYPE/NO.	BLOWS ON SAMPLER PER ( )	RECOVERY (inch)	DESCRIPTION	USCS SYMBOL	SOIL PROFILE	WELL CONSTUCTION	REMARKS
	VWRD			CONCRETE SAND/CLAY SUBGRADE	FILL			
	2027			V.Stiff, Black, Highly Plastic Clay Firm to Stiff, Lt.Tan, Med.Plastic, Limey, Clay w/Platey LS at Bottom	CL			Moist, No Water Strong Odors
	VWRD		6"					
	2028			T.D. 4'6" On Rock Weathered, Platey Limestone Contaminated				
5								
10								
15								
20								

NOTES:

DRILLERS: Southwest Labs

12:099

COVA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 873016	PROJECT NAME: VWR - DALLAS	
BORING NUMBER: B-9 (GD-9)	COORDINATES:	DATE: 4/8/87
ELEVATION: 613.30	GWL: Depth 9.20 Date/Time 4/9 10:20	DATE STARTED: 4/8/87
ENGINEER/GEOLOGIST: R. HAMLET RH	Depth 9.20 Date/Time 4/10 2:00	DATE COMPLETED: 4/9/87
DRILLING METHODS: HOLLOW STEM AUGERS		PAGE 1 OF 1

DEPTH (ft)	SAMPLE TYPE/NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (inch)	DESCRIPTION	USCS SYMBOL	SOIL PROFILE	WELL CONSTUCTION	REMARKS
				CONCRETE SAND/CLAY SUBGRADE				
	VWRD 2012			V. Stiff, Black, Highly Plastic Clay, w/Organics, Gravels & Wood	FILL			Strong Odors >1000 ppm in Augers Water Detected ATD
5	VWRD 2013	8 13 16	7"					
				Firm to Soft, LT. Tan, Med. Plastic Limey Clay w/Highly Weathered LS Fragments				
	VWRD 2014	50 2 in	12"	LS Boulder.	CL			Boulder - Organics Odor in Rock Fragments.
10								No Water In Hole At Time of Drilling. Water Lense On Top of Weathered LS.
	VWRD 2038		18"	Firm, LT. Tan, Med. Plastic, Limey Clay w/Highly Weathered LS Fragments				
15	VWRD 2040	50/4"	9"					
				TD 15' - 9" CONTAMINATED WEATHERED PLATEY LS.				
20								

NOTES:

DRILLERS: Southwest Labs

12:100

ECOVA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 873016	PROJECT NAME: VWR - DALLAS	
BORING NUMBER: B-10 (GD-10)	COORDINATES:	DATE: 4/8/87
ELEVATION: 611.48	GWL: Depth / Date/Time	DATE STARTED:
ENGINEER/GEOLOGIST: R. HAMLET RH	Depth / Date/Time	DATE COMPLETED: 4/8/87
DRILLING METHODS: HOLLOW STEM AUGERS		PAGE 1 OF 1

DEPTH (ft)	SAMPLE TYPE/NO.	BLOWS ON SAMPLER PER ( )	RECOVERY (inch)	DESCRIPTION	USCS SYMBOL	SOIL PROFILE	WELL CONSTUCTION	REMARKS
	VWRD			CONCRETE SAND/CLAY SUBGRADE				
	2029			V. Stiff, Black, Highly Plastic, Clay w/Apparent Vertical Fractures	FILL			No Water
	VWRD		3"	Stiff, LT.Tan, Med,Plastic, Limey, Clay	CL			Strong Odors
5	2030			T.D. 4' - 3" On Rock Weathered, Platey Limestone Contaminated				
10								
15								
20								

NOTES:

DRILLERS: Southwest Labs

12/101

ECOVA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 873016	PROJECT NAME: VWR - DALLAS	
BORING NUMBER: B-11 (GD-11)	COORDINATES:	DATE: 4/8/87
ELEVATION: 612.86	GWL: Depth Date/Time	DATE STARTED:
ENGINEER/GEOLOGIST: R. HAMLET RH	Depth Date/Time	DATE COMPLETED: 4/8/87
DRILLING METHODS: HOLLOW STEM AUGERS		PAGE 1 OF 1

DEPTH (ft)	SAMPLE TYPE/NO.	BLOWS ON SAMPLER PER ( )	RECOVERY (inch)	DESCRIPTION	USCS SYMBOL	SOIL PROFILE	WELL CONSTUCTION	REMARKS
				CONCRETE				
	VWRD			SAND/CLAY SUBGRADE	FILL			
	2031		6"	V.Stiff, Black, Highly Plastic Clay Fill w/Gravels (1 sample recovered) Indications of Fracturing	FILL			Moist Area Strong Odors
5	VWRD 2032		18"	Firm, Lt.Tan, Med.Plastic, Limey Clay w/Platey Ls on Bottom	CL			No Water
				T.D. 5 1/6" on Rock Weathered Platey Limestone Contaminated				
10								
15								
20								

NOTES:

DRILLERS: Southwest Labs

12;102

ECOVA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 873016	PROJECT NAME: VWR - DALLAS		
BORING NUMBER: B-12 (GD-12)	COORDINATES:		DATE: 4/7/87
ELEVATION: 613.19	GWL: Depth 8.45	Date/Time 4/9 10:20	DATE STARTED: 4/7/87
ENGINEER/GEOLOGIST: HAMLET	Depth 9.00	Date/Time 4/10 2:00	DATE COMPLETED: 4/7/87
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 1 OF 1

DEPTH (ft.)	SAMPLE TYPE/NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (inch)	DESCRIPTION	USCS SYMBOL	SOIL PROFILE	WELL CONSTUCTION	REMARKS
				CONCRETE				
	VWRD-2001		4"	SAND/CLAY SUBGRADE	FILL			
	LOST			Very Stiff, Black, Highly Plastic, Clay Fill w/Organics, LS & Brick Debris.	FILL			
	VWRD 2002	15 19 24	7"					
5	VWRD 2003	13 22 30	7"					Strong Organic Odors, Clay Very Moist.
	VWRD 2004	6 5 7	18"	Soft, Altered LS to Clay, Lt. Tan, Med/Low Plastic, Limey W/LS Fragments.				
	VWRD 2005	8 7 6	18"					Static Water Level
10	VWRD 2006	5 5 6	18"		CL			
	VWRD 2007	6 6 7	18"					Water Level ATD & Top of Water Lense.
				TOTAL DEPTH 13' CONTAMINATED				
15								
20								

NOTES:

DRILLERS: Southwest Labs

12:103

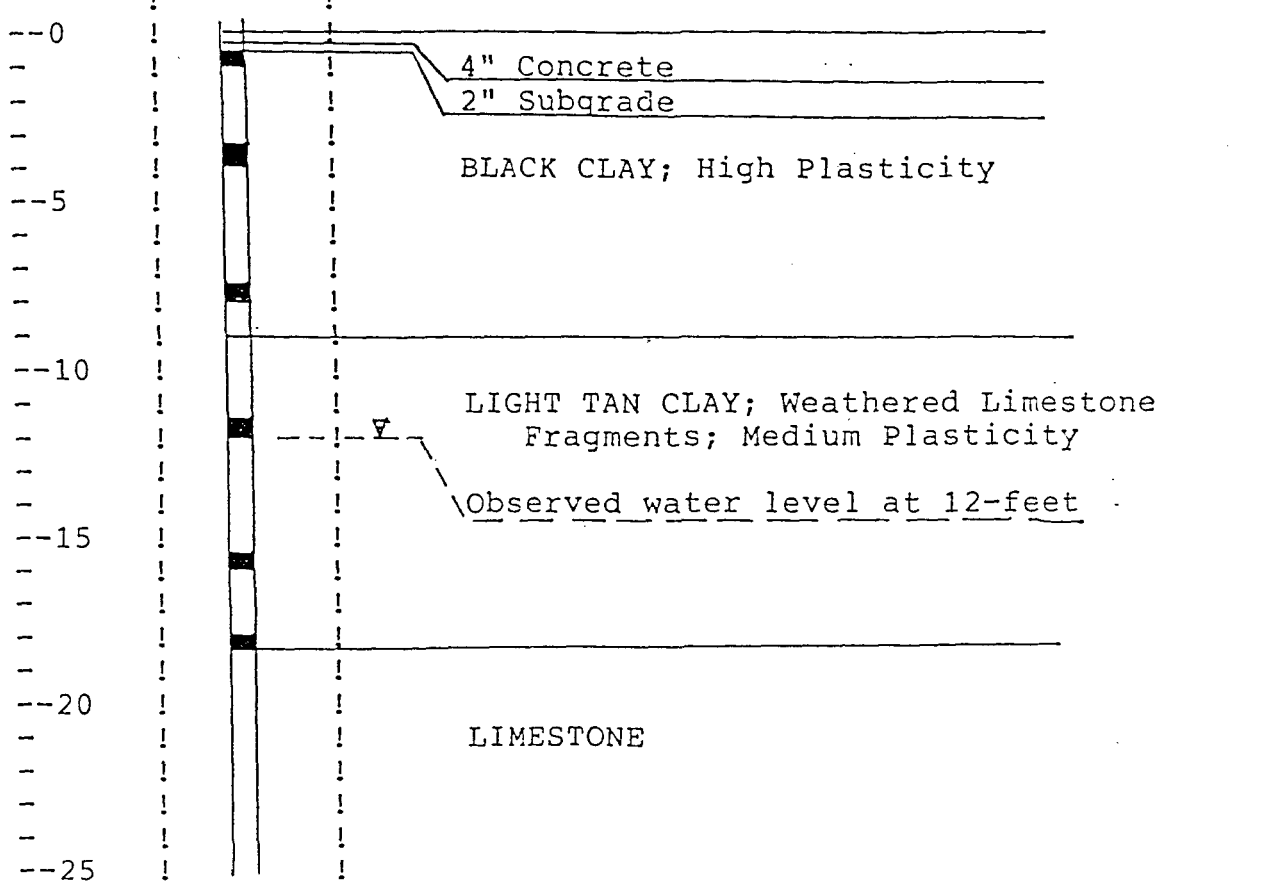
APPENDIX B

GLENN G. DRAPER ENGINEERING LOGS OF BORINGS

LOG OF BORING NO. B-13 (GD-13)

Project: VAN WATERS & ROGERS
Location: FARMERS BRANCH, TX

Drilling Co: SOUTHWEST LAB.
Logged By: GLENN DRAPER
Date Drilled: 7/20/87
Depth Hole: 18.5-feet
Ground Elevation:

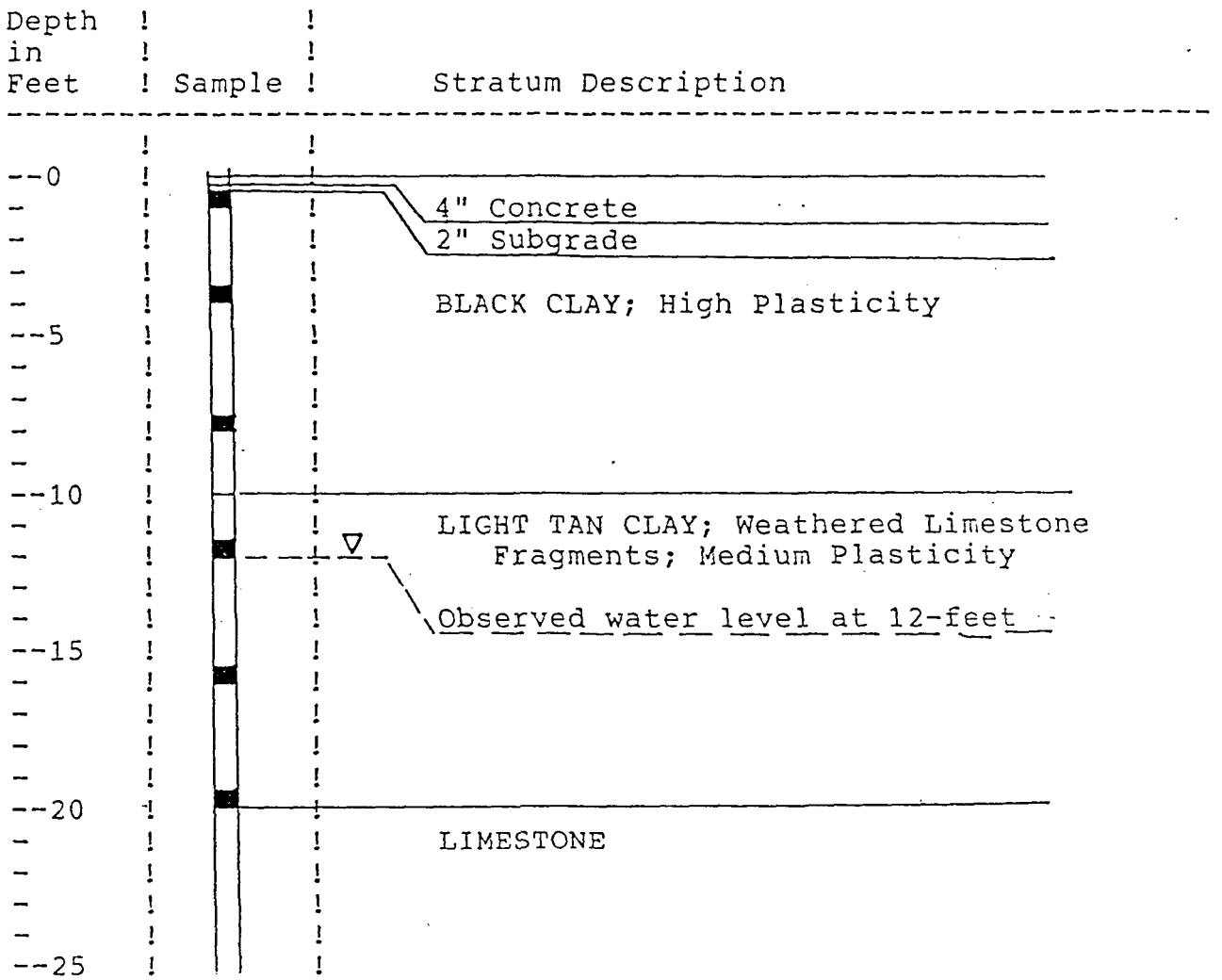


12:105

LOG OF BORING NO. B-14 (GD-14)

Project: VAN WATERS & ROGERS
Location: FARMERS BRANCH, TX

Drilling Co: SOUTHWEST LAB.
Logged By: GLENN DRAPER
Date Drilled: 7/20/87
Depth Hole: 20-feet
Ground Elevation:



12;106

LOG OF BORING NO. B-15 (GD-15)

Project: VAN WATERS & ROGERS
Location: FARMERS BRANCH, TX

Drilling Co: SOUTHWEST LAB.
Logged By: GLENN DRAPER
Date Drilled: 7/20/87
Depth Hole: 15-feet
Ground Elevation:

Depth in Feet	Sample	Stratum Description
0		4" Concrete
		2" Subgrade
		BLACK CLAY; High Plasticity
5		Unknown; sample loss due to limestone rock blocking sample tube opening during coring
10		BLACK CLAY; High Plasticity
		LIGHT TAN CLAY; Weathered Limestone Fragments; Medium Plasticity
15		LIMESTONE
20		
25		

12:107

LOG OF BORING NO. B-16 (GD-16)

Project: VAN WATERS & ROGERS
Location: FARMERS BRANCH, TX

Drilling Co: SOUTHWEST LAB. Date Drilled: 7/20/87
Logged By: GLENN DRAPER Depth Hole: 9-feet
Ground Elevation:

Depth in Feet	Sample	Stratum Description
0		4" Concrete
		2" Subgrade
		BLACK CLAY; High Plasticity
5		LIGHT TAN CLAY; Weathered Limestone Fragments; Medium Plasticity
		BLACK CLAY; High Plasticity
10		LIGHT TAN CLAY; Weathered Limestone Fragments; Medium Plasticity
		LIMESTONE
15		(no observed water)
20		
25		

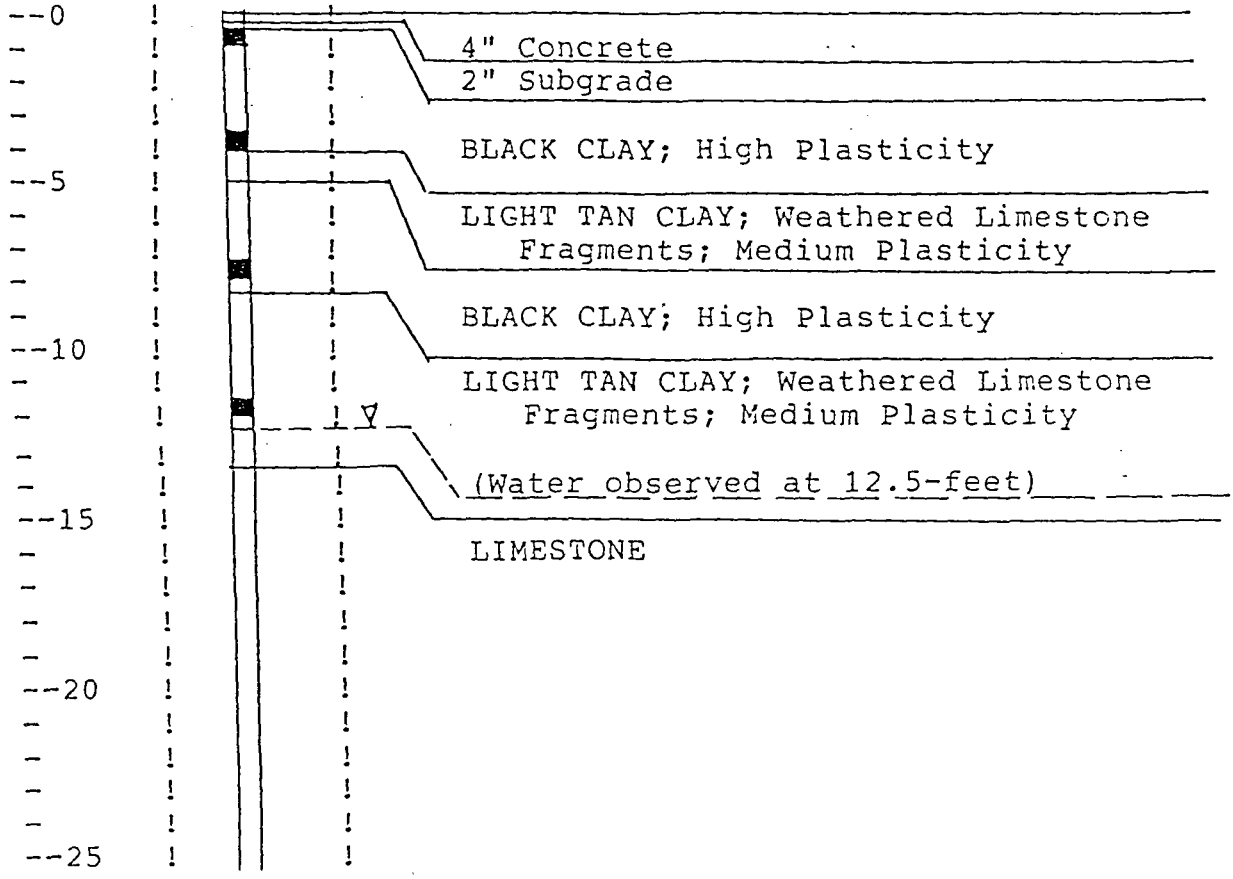
12:108

LOG OF BORING NO. B-17 (GD-17)

Project: VAN WATERS & ROGERS
Location: FARMERS BRANCH, TX

Drilling Co: SOUTHWEST LAB.
Logged By: GLENN DRAPER

Date Drilled: 7/20/87
Depth Hole: 13.5-feet
Ground Elevation:



12:109

LOG OF BORING NO. B-18 (GD-18)

Project: VAN WATERS & ROGERS
Location: FARMERS BRANCH, TX

Drilling Co: SOUTHWEST LAB. Date Drilled: 9/28/87
Logged By: GLENN DRAPER Depth Hole: 5-feet
Ground Elevation:

Depth in Feet	Sample	Stratum Description
--0		CONCRETE; 4"
-		SUBGRADE; 2"
-		
-		BLACK CLAY; High Plasticity
--5		
-		Hard surface encountered; uncertain
-		whether this was the hard limestone
-		or a large limestone rock
-		
--10		(No observed water)
-		
-		
-		
-		
--15		
-		
-		
-		
-		
--20		
-		
-		
-		
-		
--25		

12:110

LOG OF BORING NO. B-19 (GD-19)

Project: VAN WATERS & ROGERS
Location: FARMERS BRANCH, TX

Drilling Co: SOUTHWEST LAB. Date Drilled: 9/28/87
Logged By: GLENN DRAPER Depth Hole: 10-feet
Ground Elevation:

Depth in Feet	Sample	Stratum Description
0		4" Concrete
		2" Subgrade
		BLACK CLAY; High Plasticity
5		
		LIGHT TAN CLAY; Weathered Limestone Fragments; Medium Plasticity
10		LIMESTONE
		No observed water
15		
20		LIMESTONE
25		

12:111

LOG OF BORING NO. B-20 (GD-20)

Project: VAN WATERS & ROGERS
Location: FARMERS BRANCH, TX

Drilling Co: SOUTHWEST LAB.
Logged By: GLENN DRAPER

Date Drilled: 9/28/87
Depth Hole: 9.5-feet
Ground Elevation:

Depth in Feet	Sample	Stratum Description
--0		4" Concrete
		2" Subgrade
--5		BLACK CLAY; High Plasticity
		LIGHT TAN CLAY; Weathered Limestone Fragments; Medium Plasticity
--10		LIMESTONE
		No observed water
--15		
--20		LIMESTONE
--25		

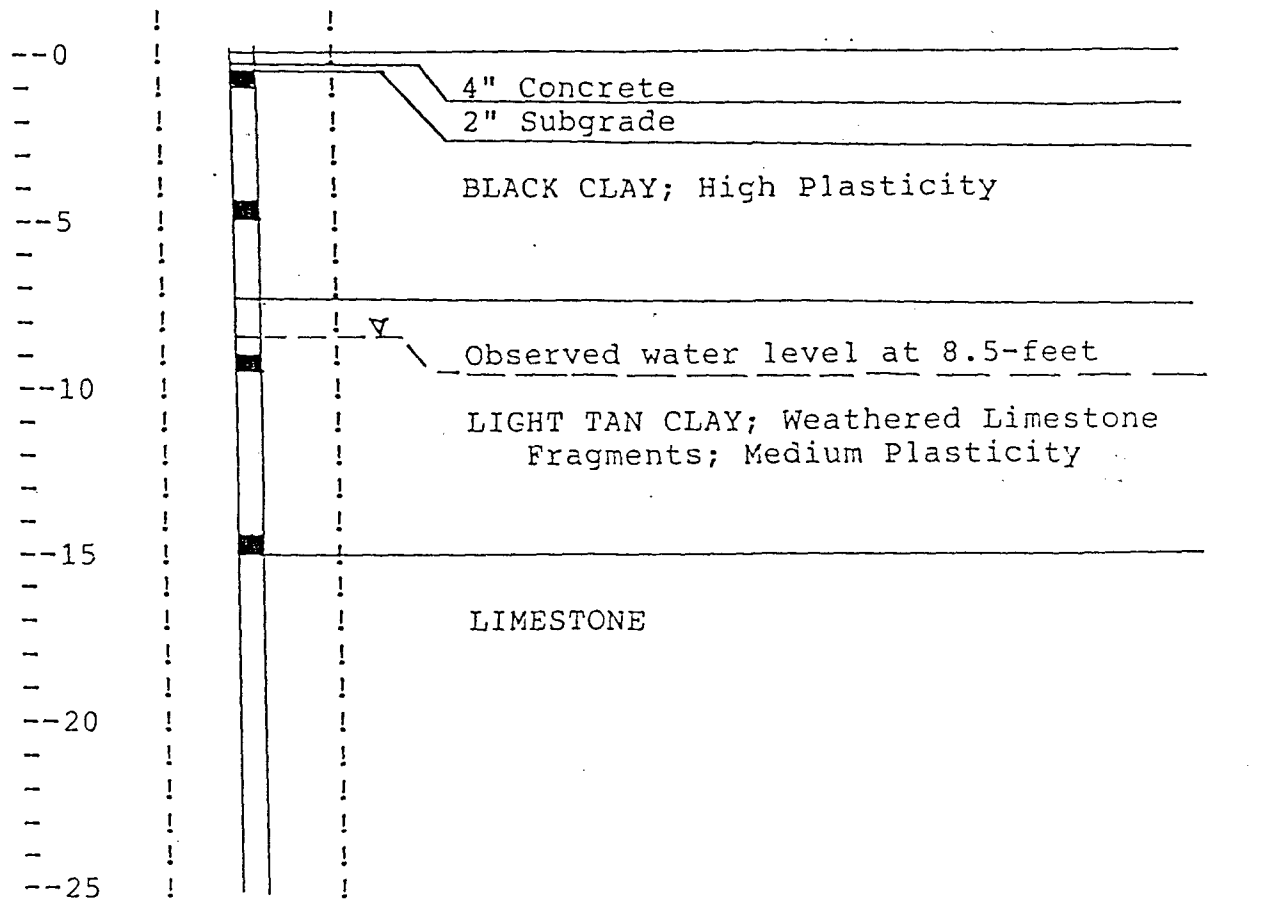
12:112

LOG OF BORING NO. B-21 (GD-21)

Project: VAN WATERS & ROGERS
Location: FARMERS BRANCH, TX

Drilling Co: SOUTHWEST LAB.
Logged By: GLENN DRAPER

Date Drilled: 9/28/87
Depth Hole: 15-feet
Ground Elevation:



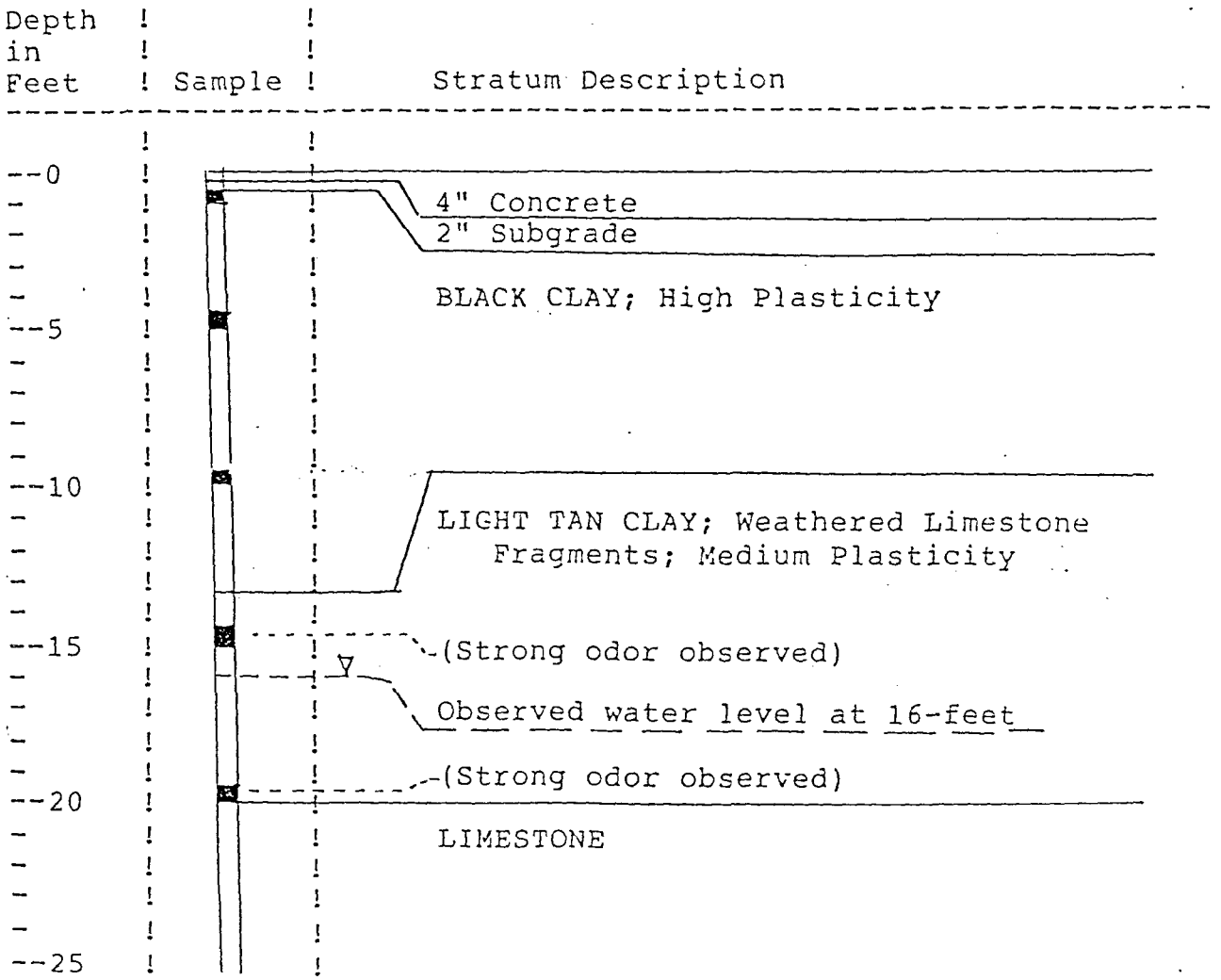
12:113

LOG OF BORING NO. B-23 (GD-23)

Project: VAN WATERS & ROGERS
Location: FARMERS BRANCH, TX

Drilling Co: SOUTHWEST LAB.
Logged By: GLENN DRAPER

Date Drilled: 9/28/87
Depth Hole: 20-feet
Ground Elevation:



12:114

APPENDIX C

HARDING LAWSON ASSOCIATES LOGS OF BORINGS

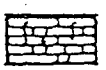
12:115

MAJOR DIVISIONS					TYPICAL NAMES
COARSE-GRAINED SOILS (MORE THAN HALF IS LARGER THAN NO. 200 SIEVE)	GRAVELS (MORE THAN HALF COARSE FRACTION IS LARGER THAN No. 4 SIEVE SIZE)	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW		WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES
			GP		POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 12% FINES	GM		SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC		CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS (MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE)	CLEAN SANDS WITH LITTLE OR NO FINES	SW		WELL-GRADED SANDS, GRAVELLY SANDS
			SP		POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 12% FINES	SM		SILTY SANDS, POORLY GRADED SAND-SILT MIXTURES
			SC		CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE-GRAINED SOILS (MORE THAN HALF IS SMALLER THAN NO. 200 SIEVE)	SILTS AND CLAYS (LIQUID LIMIT 50% OR LESS)		ML		INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL		ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS (LIQUID LIMIT GREATER THAN 50%)		MH		INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH		ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt		PEAT AND OTHER HIGHLY ORGANIC SOILS

UNIFIED SOIL CLASSIFICATION SYSTEM

Perm — Permeability
Consol — Consolidation
LL — Liquid Limit (%)
PI — Plastic Index (%)
G_s — Specific Gravity
MA — Particle Size Analysis
"Undisturbed" Sample
Bulk or Classification Sample
MC -- Moisture Content
UDW -- Unit Dry Weight (pcf)
UC -- Unconfined Compressive Strength (psf)

 Limestone

 Weathered Limestone

 Shale

 Pavement

2-6-87 ▼ Water level at date indicated

TOX : Total Organic Halides, as measured during field operations

RQD : Rock Quality Designation; ratio of the testable length of core to that recovered

KEY TO TEST DATA

Harding Lawson Associates
Engineers, Geologists & Geophysicists

LEGEND TO BORING LOGS
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE 37

12:116

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
MLN	09695,023.15	JSH	06-02-88		

Equipment Mobile B-53 HLA-1

Elevation 613.29 Date 4-5-88

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft)	Sample	
						0		CONCRETE/CUSHION SAND
	24"	24"	33					TAN WEATHERED LIMESTONE soft, fossiliferous.
								-shell parting at 3.9'
						5		(AUSTIN CHALK FORMATION)
	60"	59"	80					GRAY LIMESTONE soft to moderately hard, unweathered, with occasional fossil shells. With 0.1' tan clay seam from 6.5-6.6'; marly seam at 6.8'
						10		-weathered clay seam at 9.5' (approximately 1/2").
	54"	54"	83					-marly seam at 13.0'
						15		(AUSTIN CHALK FORMATION)
								End of boring at 13.5'
						20		
						25		
						30		
						35		
						40		

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LOG OF BORING HLA-1
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE 9

12/117

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09695,023.15		5-27-88		

Equipment Mobile B-53 HLA-2

Elevation 613.51 Date 4-5-88

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft) Sample	
						0	CONCRETE
	33"	22"	64	2.0			DARK GRAY CLAY (Fill) with sand; stiff, moist. (CH)
	58"	52"	79			5	TAN WEATHERED LIMESTONE soft, fractured. -severely weathered from 4.8-5.5' (AUSTIN CHALK FORMATION)
	60"	48"	87			10	GRAY LIMESTONE soft to moderately hard, unweathered. -shell parting at 11.5'
	48"	47"	83			15	-numerous shell partings at 15.0' (AUSTIN CHALK FORMATION)
						20	End of Boring at 18.5'
						25	
						30	
						35	
						40	

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LOG OF BORING HLA-2
WW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE
10

12/118

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09695,023.15	JSH	5-27-88		

Equipment Mobile B-53 HLA-3

Elevation 613.22 Date 4-6-88

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft)	Sample	
						0		CONCRETE
								DARK GRAY CLAY (Fill) occasional calcareous fragments; stiff, with 3" pad sand from 0.5-0.75', very moist. (CH)
	24"	6"	0	2.5				
						5		TAN WEATHERED LIMESTONE soft, fractured with occasional clay laminations.
	60"	52"	75					-tan clay seam from 8.8-9.0'.
	60"	48"	44			10		-clay seam at 11.8'
								-iron staining at 12.5'
								-gray from 13.7-14.3'
	60"	56"	43			15		-slightly fossiliferous
								-clay seam at 16.3', gray from 16.5-18.2'
								-clay seam at 18.4'
						20		-high-angle slickenside from 20.3-20.5'
								-low-angle slickenside at 21.0'
	60"	50"	43					(AUSTIN CHALK FORMATION)
								GRAY LIMESTONE soft to moderately hard, unweathered, with iron-stained marl seam at 22.5', with occasional fossils.
	60"	36"	55			25		
	18"	18"	100					
								0.6' seam of bentonitic clay from 22.8-23.3'
	36"	36"	78			30		(AUSTIN CHALK FORMATION)
						35		End of Boring at 34.0'
						40		

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LOG OF BORING HLA-3
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE 11

12:119

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09695,023.15	MLD	5-27-88		

Equipment Mobile B-53 HLA-4A

Elevation 612.75 Date 4-10-88

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft)	Sample	
						0		CONCRETE /CUSHION SAND
								DARK GRAY CLAY with calcareous fragments. (CH)
						5		
								TAN AND GRAY CLAY calcareous, iron-stained, stiff below 6.5' (CL)
1.81								
						10		-groundwater at 10.0'
								4-10-88
0.3						15		
1.3								
						20		TAN WEATHERED LIMESTONE soft, with iron staining
	48"	48"	88					(AUSTIN CHALK FORMATION)
								GRAY LIMESTONE soft to moderately hard, unweathered, with shell fossils.
						25		0.4' bentonitic clay seam from 25.0-25.4'
	54"	54"	94					-shell parting at 25.4'
								-shell parting at 26.0'
						30		-shell parting at 29.5'
								-shell parting at 30.5'
	54"	54"	98					-slickensided from 32.0-32.3'
	36"	36"	100					
						35		(AUSTIN CHALK FORMATION)
								End of Boring at 36.0'
						40		

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LOG OF BORING HLA-4A
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE 12

12:120

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09595.023.15		5-27-88		

HLA-4

Equipment Mobile B-53

Elevation 612.78 Date 4-6-88

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft) Sample	
						0	CONCRETE/CUSHION SAND
				2.5			DARK BROWN CLAY stiff, with calcareous nodules and occasional sand seams. (CH)
				2.0			
				2.5		5	TAN CLAY firm to very stiff, calcareous, limestone fragments, iron-staining, limestone gravel seams, reworked.
	42"	0"	0				
	48"	0"	0			10	
	60"	17"	10			15	
	60"	44"	25			20	TAN WEATHERED LIMESTONE soft, with iron staining, fractured. (AUSTIN CHALK FORMATION)
							GRAY LIMESTONE soft to moderately hard, unweathered.
	60"	48"	65			25	0.5' seam of bentonitic clay from 25.4-25.8' with pyrite crystals. -high angle slickenside at 29.5' (AUSTIN CHALK FORMATION)
	60"	60"	100			30	
						35	End of Boring at 33.5'
						40	

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LOG OF BORING HLA-4
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE 13

12:12

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09695,023.15	MKD	5-27-88		

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft)	Sample
						0	
	48"	20"	15			5	
	54"	36"	24			10	
	60"	54"	71			15	
	60"	58"	94			20	
						25	
						30	
						35	
						40	

Equipment Mobile B-53 HLA-5

Elevation 612.37 Date 4-6-88

CONCRETE/CUSHION SAND
with clay fill.

TAN WEATHERED LIMESTONE
soft, iron staining.

-1" clay seam at 7.5'

-1" clay seam at 9.0'

-gray from 9.5-11.2'

-iron-stained clay seam at 11.5'

(AUSTIN CHALK FORMATION)

GRAY LIMESTONE
soft to moderately hard, unweathered.

-shell partings at 19.0'

(AUSTIN CHALK FORMATION)

End of Boring at 19.5'

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LOG OF BORING HLA-5
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE
14

12/122

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09595.023.15		5-27-88		

Equipment Mobile B-53 HLA-6

Elevation 614.84 Date 4-7-88

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft)	Sample	
				2.25		0		ASPHALT PAVEMENT/CLAY (Fill)
	42"	36"	90					TAN WEATHERED LIMESTONE soft, fractured, iron-stained.
1.6						5		-0.25" iron-stained seam at 2.0' and 3.5'
								(AUSTIN CHALK FORMATION)
	60"	58"	85					GRAY LIMESTONE soft to moderately hard, unweathered, with fossil shell fragments.
2.4								
2.2	60"	58"	95			10		-dark gray clay seam from 8.5-8.6'
								-0.1' clay seam at 10.8'and 12.7'
								-shell partings at 11.0' and 14.0'
						15		(AUSTIN CHALK FORMATION)
								End of Boring at 14.5'
						20		
						25		
						30		
						35		
						40		

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LOG OF BORING HLA-6
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE 15

12/123

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09695,023.15		5-27-88		

HLA-7

Equipment Mobile B-53

Elevation 612.76 Date 4-13-88

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft)	Sample	
0.7						0		CONCRETE/CUSHION SAND
<0.1	30"	18"	27					TAN WEATHERED LIMESTONE soft, with iron-stained fractures, with fossil shells.
						5		-clay partings/laminations from 5.0-6.4'
	54"	51"	63					-shell partings at 6.9'
								-iron stained clay seam at 7.2' and 7.8-8.0'
<0.1						10		(AUSTIN CHALK FORMATION)
	54"	54"	100					GRAY LIMESTONE soft to moderately hard, unweathered, marly from 10.3-10.6'
<0.1	24"	22"	95					-shell parting at 12.3', 12.6', and 13.5'
						15		(AUSTIN CHALK FORMATION)
								End of Boring at 15.5'
						20		
						25		
						30		
						35		
						40		

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LOG OF BORING HLA-7
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE 16

12:124

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09695,023.15	MLD	5-27-88		

HLA-8

Equipment Mobile B-53

Elevation 616.20 Date 4-15-88

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft)	Sample	
				2.5		0		CONCRETE
				2.0				DARK GRAY CLAY (Fill) stiff, moist, with cushion sand, limestone fragments. (CH)
<0.1				2.0		5		-matted roots at 6.5'
				3.0				BROWN/GRAY CLAY stiff, moist with calcareous nodules and occasional phosphatic nodules. (CH-CL)
				2.0				
				2.75				
0.8				3.25		10		TAN AND GRAY SILTY CLAY moist, iron-stained, very stiff to firm. (CL)
				1.5				
				1.75				-numerous limestone fragments and nodules at 13.0'
				2.75				
1.2				2.25		15		-heavily iron-stained below 14.0'
				1.75				-water at 17.0'
				1.25				
						20		TAN WEATHERED LIMESTONE soft, iron-stained, with fossil shells.
28.4	54"	36"	40					-45° fracture at 21.5'
								-45° fracture at 22.2'
								-weathered clay seam from 22.3-23.0'
								(AUSTIN CHALK FORMATION)
2.4	60"	60"	80			25		GRAY LIMESTONE soft to moderately hard, unweathered, with shell fossils.
	42"	42"	75					-shell partings at 28.7, 29.9, and 30.3'
						30		-bentonitic clay seam from 29.0-29.8'
								(AUSTIN CHALK FORMATION)
								End of Boring at 32.0'
						35		
						40		

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LOG OF BORING HLA-8
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE 17

12:125

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09595,023.15	MLN	5-27-88		

Equipment Mobile B-53 HLA-9

Elevation 611.51 Date 4-15-88

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft)	Sample
				2.75 3.25		0	
<0.1	36"	31"	86			5	
	30"	30"	100				
<0.1	48"	48"	100			10	
						15	
						20	
						25	
						30	
						35	
						40	

CONCRETE

DARK GRAY CLAY (Fill)
stiff to very stiff, moist, rock fragments. (CH)

TAN WEATHERED LIMESTONE
soft, iron-stained.
-6" seam of gray limestone from 3.9-4.2'
(AUSTIN CHALK FORMATION)

GRAY LIMESTONE
soft to moderately hard, unweathered, occasional fossil shells, shell parting at 9.0' and 13.0'
(AUSTIN CHALK FORMATION)

End of Boring at 13.0'

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LOG OF BORING HLA-9
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE 18

12:126

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09695,023.15	MLD	5-27-88		

Equipment Mobile B-53 HLA-10

Elevation 613.40 Date 4-14-88

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL / PI / (-) 200	Depth (ft) / Sample	
1.2				2.5		0	CONCRETE/CUSHION SAND
2.2				1.5			DARK GRAY CLAY (Fill) stiff, moist, with limestone fragments. (CH)
3.0				2.5		5	GRAY/BROWN CLAY stiff to very stiff with numerous calcareous nodules and phosphatic nodules. (CH-CL)
				3.0			
10.6				3.0			
				3.0		10	
				2.25			TAN AND GRAY SILTY CLAY firm to stiff, moist, iron-stained, with limestone fragments. (CL)
4.8				2.25			
				2.0			
				2.0		15	
				0.75			
13.9				0.5			
				3.75			
				2.5			
				1.25		20	
277.0				1.0			
	36"	33"	80				TAN WEATHERED LIMESTONE soft, iron-stained with clay partings at 21.7' -shell parting at 22.7' -marly from 22.5-22.9' (AUSTIN CHALK FORMATION)
3.5						25	GRAY LIMESTONE soft to moderately hard, unweathered, with shell fossils, marly from 23.7-24.8' -bentonitic clay seam from 24.8-25.3'
	60"	45"	80				
	36"	28"	90				
	60"	60"	98			30	-shell partings at 32.0'
2.7							
	36"	36"	100			35	-marly from 38.2-38.6' (AUSTIN CHALK FORMATION)
						40	(Continued on Next Page)

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LOG OF BORING HLA-10
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE 19

12/127

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09595.023.15	MLD	5-27-88		

HLA-10

(Continuation of Log)

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM.	LL PI (-)200	Depth (ft)	Sample	
	39"	39"	95			40		GRAY LIMESTONE (AUSTIN CHALK FORMATION)
								End of Boring at 43.3'
						45		
						50		
						55		
						60		
						65		
						70		
						75		
						80		

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LOG OF BORING HLA -10
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE
20

12:128

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09595,023.15		5-27-88		

Equipment Mobile B-53 HLA-11

Elevation 610.03 Date 4-16-88

TOX (ppm)	CORE DRILLED	CORE RECOVERED	ROD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft)	Sample	
<0.1						0		CONCRETE/CUSHION SAND with clay.
								TAN WEATHERED LIMESTONE soft, iron-stained, with shell fossils, clay seams and occasional fractures.
	30"	30"	60					
						5		-weathered clay seam from 4.0-4.5'
<0.1								-gray from 4.5-4.6'
								(AUSTIN CHALK FORMATION)
<0.1								
	54"	54"	87					GRAY LIMESTONE soft to moderately hard, unweathered, with shell fossils; marly seams from 12.5-13.0'
	48"	46"	95			10		
0.8								-shell parting at 12.8'
								(AUSTIN CHALK FORMATION)
								End of Boring at 13.5'
						15		
						20		
						25		
						30		
						35		
						40		

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LOG OF BORING HLA-11
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE 21

12:129

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09595,023.15		5-27-88		

Equipment Mobile B-53 HLA-12

Elevation 611.79 Date 4-16-88

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft) Sample	
0.3						0	CONCRETE/CUSHION SAND
				2.5			DARK GRAY CLAY (Fill)
				2.5			limestone fragments, stiff to very stiff. (CH)
				2.75			
2.1				3.5			
				2.75		5 ▼ 4-16-88	
<0.1							TAN WEATHERED LIMESTONE
	12"	12"	75				soft, iron-stained, with fossil shell partings
							-shell parting at 8.0'
	54"	36"	64			10	
1.9							-shell parting at 13.0' with iron staining.
	36"	36"	100				(AUSTIN CHALK FORMATION)
<0.1						15	GRAY LIMESTONE
	54"	53"	98				moderately hard, with shell fossils; marly with 0.1' weathered clay seam from 14.5-14.6'
						20	
	54"	53"	98				
<0.1							—bentonitic clay seam from 20.7-21.5'
							-shell parting at 23.5'
	60"	57"	95			25	
						30	
	60"	60"	100				-marly at 34.0-34.2'
							(AUSTIN CHALK FORMATION)
						35	End of Boring at 34.5'
						40	

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LOG OF BORING HLA-12
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE 22

12:1130

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09695,023.15	MLD	5-27-88		

Equipment Mobile B-53 HLA-13

Elevation 612.26 Date 4-11-88

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft) Sample	
				3.0		0	CONCRETE/CUSHION SAND
				1.5			DARK GRAY CLAY (Fill) firm, with limestone fragments. (CH)
				1.5		5	
1.5				2.5			
				3.0			
				1.5			
0.6				3.5		10	BROWN CLAY firm to stiff, moist, iron-stained, with calcareous nodules, becomes lighter. (CH-CL)
				3.5		▼ 4-11-88	
3.4				3.0			
0.7				2.5			
				1.5		15	TAN AND GRAY SILTY CLAY moist, iron stains, rock fragments, firm to stiff (CL). Reworked Austin Chalk.
<0.1							
				1.5			
<0.1				2.0			
				2.5		20	
	18"	12"	61				TAN WEATHERED LIMESTONE soft, laminated fractured seams, iron-stained
	30"	30"	60				
118.0						25	-clay seam from 22.9-23.1'
							-gray laminations from 24.3-26.5' with shell parting at 26.0'
	36"	32"	60				-bentonitic clay seam from 26.8-27.6'
<0.1							GRAY LIMESTONE soft to moderately hard, unweathered, with fossil shells
	60"	60"	75			30	-slickenside at 28.3'
							-shell parting from 28.6-28.8'
<0.1							-high-angle slickenside from 31.2-31.6'
						35	-high-angle slickenside from 33.1-33.4'
	60"	60"	100				-shell parting at 34.5'
							-slickenside at 36.5'
						40	

(Continued on Next Page)

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LOG OF BORING HLA-13
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE 23

12/13/

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09695,023.15		5-27-88		

HLA-13

(Continuation of Log)

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM.	LL PI (-)200	Depth (ft)	Sample
	54"	54"	100			40	
<0.1	54"	54"	87			45	
						50	
						55	
						60	
						65	
						70	
						75	
						80	

GRAY LIMESTONE

-marly seam from 44.0-44.1

-1"marly seam from 45.9-46.0'

(AUSTIN CHALK FORMATION)

End of Boring at 48.5'

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LOG OF BORING HLA -13
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE
24

12/132

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09595,023.15		5-27-88		

HLA-14

Equipment Mobile B-53

Elevation 611.81 Date 4-12-88

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft)	Sample	
				1.5		0		CONCRETE/CUSHION SAND
				2.5				DARK GRAY CLAY (Fill) stiff, with calcareous nodules and fragments, moist with roots. (CH)
				2.25		5		
				2.75				
				1.0				BROWN GRAY CLAY stiff, moist, becoming tan, silty, with numerous calcareous nodules, phosphatic nodules, iron stains. (CL-CH)
				0.75				
				0.75		10		-wet at 12.5'
				0.5				
				1.25				
				3.25		▼ 4-12-88		
						15		
	30"	12"	0					TAN WEATHERED LIMESTONE soft, with clay seams, iron-staining.
								(AUSTIN CHALK FORMATION)
	48"	48"	94			20		GRAY LIMESTONE soft to moderately hard, unweathered, marly from 20.7-21.3' with occasional fossil shells.
								-marly from 23.0-23.6'
	48"	48"	88			25		-shell parting at 23.3'
								-shell parting at 25.8'
	60"	60"	95					-bentonitic clay seam from 27.0-27.5'
						30		-marly from 27.5-30.0'
	30"	30"	100					-shell parting at 31.0'
						35		
	48"	36"	75					-marly from 36.8-37.1'
								(AUSTIN CHALK FORMATION)
						40		End of Boring at 39.5'

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LOG OF BORING HLA-14
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE 25

12133

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09595,023.15		5-27-88		

Equipment Mobile B-53 HLA-15

Elevation 611.76 Date 4-13-88

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM (tsf)	LL PI (-) 200	Depth (ft)	Sample	
				3.25		0		CONCRETE/CUSHION SAND
				4.0				DARK GRAY CLAY (Fill) with brown to tan zones, limestone fragments, very stiff, moist. (CH)
0.5				3.5				
				1.5		5		BROWN/GRAY CLAY with tan, firm, limestone fragments, calcareous nodules, iron stains, limestone gravel (CL)
				1.0				
				0.5				
0.6				1.0				
				1.25		▼ 10		-wet at 10.0'
				2.0		4-13-88		
				2.5				
				4.5+				
<0.1						15		TAN WEATHERED LIMESTONE soft, clayey, with iron staining.
0.4								-light gray clay from 17.0-17.5' (AUSTIN CHALK FORMATION)
	36"	18"	78			20		GRAY LIMESTONE soft, to moderately hard, unweathered, marly with fossil shells and shell partings.
<0.1	36"	36"	100					(AUSTIN CHALK FORMATION)
						25		End of Boring at 24.0'
						30		
						35		
						40		

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LOG OF BORING HLA-15
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE 26

12:134

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09695,023.15		5-27-88		

Equipment Mobile B-53 HLA-16

Elevation 611.96 Date 4-8-88

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETHOM. (tsf)	LL PI (-) 200	Depth (ft)	Sample	
1.7				2.25		0		CONCRETE/CUSHION SAND
								DARK GRAY CLAY (Fill) stiff with roots, calcareous fragments. (CH)
	24"	6"	0					TAN WEATHERED LIMESTONE soft, iron-stained.
						5		-iron-stained clay seam at 5.9'
	48"	36"	74					-iron-stained clay seam at 6.8'
	42"	30"	60					(AUSTIN CHALK FORMATION)
	24"	20"	80			10		
	60"	60"	92					-clay seam at 14.0'
						15		GRAY LIMESTONE soft to moderately hard, unweathered, with shell fossils. -shell parting at 15.8 and 16.7' -shell parting at 18.9 and 21.0' (AUSTIN CHALK FORMATION)
	24"	24"	100			20		End of Boring at 21.0'
						25		
						30		
						35		
						40		

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LOG OF BORING HLA-16
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE 27

12/135

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09695,023.15	MLA	5-27-88		

HLA-17

Equipment Mobile B-53

Elevation 612.81 Date 4-7-88

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft)	Sample	
				2.75		0		CONCRETE/CUSHION SAND with clay.
1.5	36"	24"	25					TAN WEATHERED LIMESTONE soft, fractured to 3.0', with shell fossils; iron staining at 3.0'
	60"	60"	80			5		-iron-stained clay seam, at 4.5' and 5.5'. -clay parting at 5.0' (AUSTIN CHALK FORMATION)
0.4								GRAY LIMESTONE soft to moderately hard, unweathered, with shell fossils; iron-stained shell parting at 8.0'
	60"	60"	88			10		-marly seam at 10.3'
0.4								-marly seam at 12.6' (AUSTIN CHALK FORMATION)
						15		End of Boring at 14.5'
						20		
						25		
						30		
						35		
						40		

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LOG OF BORING HLA-17
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE 28

12;136

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09695,023.15		5-27-88		

Equipment Mobile B-53 HLA-18

Elevation 611.88 Date 4-17-88

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft) Sample
						0
				1.0		
				2.5		
				4.0		
				3.5		5
				4.25		
				4.25		
				4.54		
	24"	20"	80			10
	60"	57"	68			
						15
	60"	60"	98			
						20
						25
						30
						35
						40

CONCRETE/CUSHION SAND

DARK GRAY CLAY (Fill)
limestone fragments, firm, moist. (CH)

BROWN CLAY
very stiff, with numerous limestone fragments, iron staining. (CL)

TAN WEATHERED LIMESTONE
soft, with shell fossils.

-weathered clay seam from 12.0-13.0'

(AUSTIN CHALK FORMATION)

-shell parting at 15.1'

GRAY LIMESTONE
soft to moderately hard, unweathered, with shell fossils.
-shell parting at 18.3'
(AUSTIN CHALK FORMATION)

End of Boring at 20.0'

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LOG OF BORING HLA-18
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE 29

12:137

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09695,023.15	MLN	5-27-88		

Equipment Mobile B-53 HLA-19

Elevation 611.83 Date 4-18-88

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft)	Sample	
				3.0		0		CONCRETE /CUSHION SAND
				2.5				DARK GRAY CLAY (Fill) limestone fragments. (CH)
				3.5		5		BROWN/GRAY SILTY CLAY very stiff, with limestone fragments. (CL)
	60"	48"	80					TAN WEATHERED LIMESTONE soft, iron-stained, with shell partings.
						10		-weathered clay seam from 11.5-11.7'
	60"	60"	62					-slightly slickensided between 13.4-13.6'
						15		-slightly slickensided at 15.7'
								-slightly slickensided from 17.5-17.9'
	60"	60"	85					(AUSTIN CHALK FORMATION)
						20		GRAY LIMESTONE soft to moderately hard, unweathered. (AUSTIN CHALK FORMATION)
								End of Boring at 20.0'
						25		
						30		
						35		
						40		

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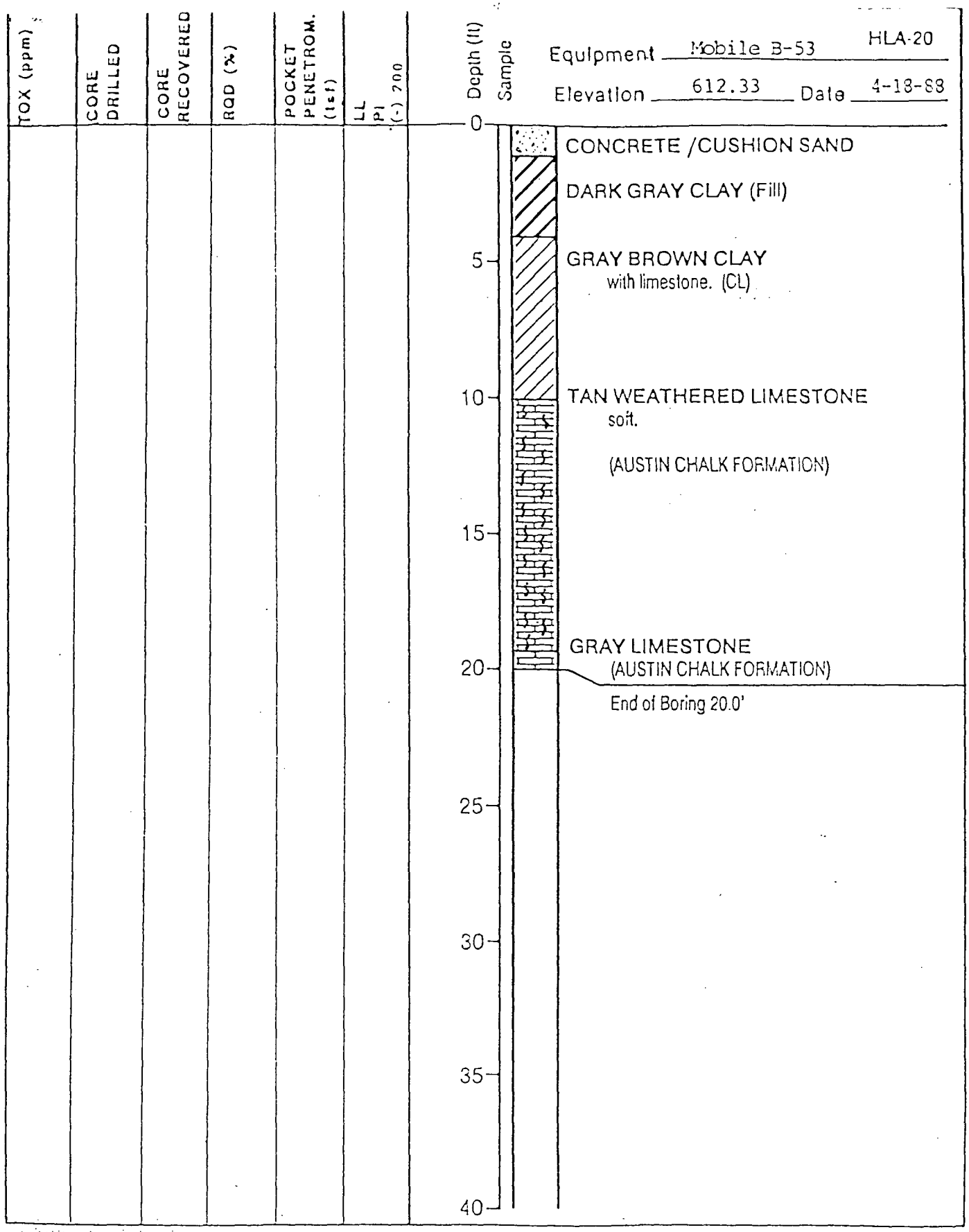
LOG OF BORING HLA-19
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE 30

12; 138

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09695,023.15		5-27-88		



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LOG OF BORING HLA-20
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

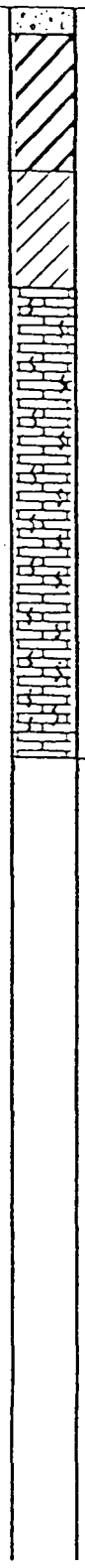
PLATE
31

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09695,023.15		5-27-88	12:139	

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft)	Sample

Equipment Mobile B-53 HLA-21

Elevation 612.13 Date 4-18-88



0 — CONCRETE/CUSHION SAND

DARK GRAY CLAY (Fill)

5 — BROWN/GRAY CLAY
with tan.

TAN WEATHERED LIMESTONE
soft, clayey.

10 — (AUSTIN CHALK FORMATION)

15

GRAY LIMESTONE
(AUSTIN CHALK FORMATION)

20 — End of Boring at 19.0'

25

30

35

40

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LOG OF BORING HLA-21
WW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE 32

12:140

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09695,023.15	MLN	5-27-88		

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft)	Sample
						0	
						5	
						10	
						15	
						20	
						25	
						30	
						35	
						40	

Equipment Mobile B-53 HLA-22

Elevation 613.47 Date 4-18-88

CONCRETE/CUSHION SAND

DARK GRAY CLAY
very stiff. (CH)

TAN WEATHERED LIMESTONE

-iron-stained, clayey.

(AUSTIN CHALK FORMATION)

GRAY LIMESTONE

(AUSTIN CHALK FORMATION)

End of Boring at 15.0'

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LOG OF BORING HLA-22
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE
33

12:14

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09695,023.15		5-27-88		

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft)	Sample
						0	
						5	
						10	
						15	
						20	
						25	
						30	
						35	
						40	

Equipment Mobile B-53 HLA-23

Elevation 613.31 Date 4-18-88

CONCRETE /CUSHION SAND

DARK GRAY CLAY (Fill)

TAN WEATHERED LIMESTONE

-with weathered brown clay at 6.0'

(AUSTIN CHALK FORMATION)

GRAY LIMESTONE

(AUSTIN CHALK FORMATION)

End of Boring at 15.0'

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LOG OF BORING HLA -23
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE 34

12;142

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09695,023.15		5-27-88		

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft)	Sample

Equipment Mobile B-53 HLA-24

Elevation 612.57 Date 4-18-88

0

CONCRETE/CUSHION SAND

DARK GRAY CLAY (Fill)

5

BROWN/GRAY CLAY
firm to very stiff. (CL-CH)

-tan and light gray below 5.5'

10

TAN WEATHERED LIMESTONE
soft.

DARK GRAY LIMESTONE
(AUSTIN CHALK FORMATION)

End of Boring at 12.0'

15

20

25

30

35

40

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LOG OF BORING HLA-24
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE
35

12/143

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09595,023.15	MLN	5-27-88		

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft)	Sample
16.1						0	
						5	
						10	
						15	
						20	
						25	
						30	
						35	
						40	

Equipment Mobile B-53 HLA-25

Elevation 612.58 Date 4-18-88

4-18-88

CONCRETE/CUSHION SAND

DARK GRAY CLAY (Fill)

BROWN/GRAY CLAY
with calcareous nodules (CH)

TAN AND GRAY CLAY

-occasional limestone fragments.

-wet at 11.5'

GRAY LIMESTONE
(AUSTIN CHALK FORMATION)

End of Boring at 20.0'

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LOG OF BORING HLA-25
VW&R Dallas Alpha Road Site
Farmers Branch, Texas

PLATE
36

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09695.023.15	MLS	5-27-88	12:1144	

HLA-26

Equipment MOBILE B-53

Elevation _____ Date 5/11/88

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft)	Sample
				4.0 4.5		0	
	60"	56"				5	▼ 5-11-88
	60"	60"	83			10	
	60"	60"	98			15	
						20	
						25	
						30	
						35	
						40	

CONCRETE/CUSHION SAND

DARK GRAY TO TAN CLAY (CL)
very stiff to hard, limestone fragments, iron staining

TAN WEATHERED LIMESTONE
soft, iron stained, clay seams, occasional shell fossils.
-1" clay seam at 6.9'
-3" clay seam at 7.4'
-shell partings at 8.5' and 9.4'
-shell partings at 11.3' and 11.5'
-soft from 12.5-12.9'

GRAY LIMESTONE
soft to moderately hard.
-shell parting at 13.5'
-soft from 15.2-15.9'
-shell parting at 17.6'
(AUSTIN CHALK FORMATION)

END OF BORING AT 18.0'

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LOG OF BORING HLA-26
VW&R DALLAS ALPHA ROAD SITE
FARMERS BRANCH, TEXAS

PLATE 12:145

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09695,023.15		11/11/88		

HLA-27

Equipment MOBILE B-53

Elevation _____ Date 5/11/88

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft)	Sample	
						0		CONCRETE/CUSHION SAND
				3.5				TAN CALCAREOUS CLAY (CL) hard, iron staining
				4.5+				
				4.5+				
	60"	58"	38			5		TAN WEATHERED LIMESTONE soft, iron staining, clay seams
								(AUSTIN CHALK FORMATION)
								-clay filled seam at 8.9-9.0'
						10		GRAY LIMESTONE soft to moderately hard, unweathered.
	60"	60"	95					-shell parting at 11.0'
								(AUSTIN CHALK FORMATION)
						15		END OF BORING AT 14.0'
						20		
						25		
						30		
						35		
						40		

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LOG OF BORING HLA-27
VW&R DALLAS ALPHA ROAD SITE
FARMERS BRANCH, TEXAS

PLATE

12/14

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09695,023.15		11/11/88		

HLA-28

Equipment CME-45

Elevation _____ Date 5/10/88

TOX (ppm)	CORE DRILLED	CORE RECOVERED	RQD (%)	POCKET PENETROM. (tsf)	LL PI (-) 200	Depth (ft)	Sample	
				2.0		0		CONCRETE/CUSHION SAND
				2.0				DARK GRAY TO DARK BROWN CLAY (CH) stiff, limestone fragments, iron staining, calcareous and phosphatic nodules
				2.75				
				3.0		5		
				4.5				TAN CALCAREOUS CLAY (CL) firm to very stiff, limestone fragments, phosphatic nodules, iron staining
				3.5		▼ 5-11-88		-wet at 7.5'
				4.5				
				1.0				
				1.5		10		
				2.5				
				2.2				
				3.0				
				3.5				
				4.5		15		
								TAN WEATHERED LIMESTONE soft, iron staining, clay seams
	60"	36"	22			20		GRAY LIMESTONE soft to moderately hard, unweathered, occasional fossil shells.
								(AUSTIN CHALK FORMATION)
						25		END OF BORING AT 25.0'
						30		
						35		
						40		

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LOG OF BORING HLA-28
VW&R DALLAS ALPHA ROAD SITE
FARMERS BRANCH, TEXAS

PLATE

12:147

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
GJL	09695.023.15		11/11/88		

VAN WATERS & RODGERS
TXD042291591
REFERENCES

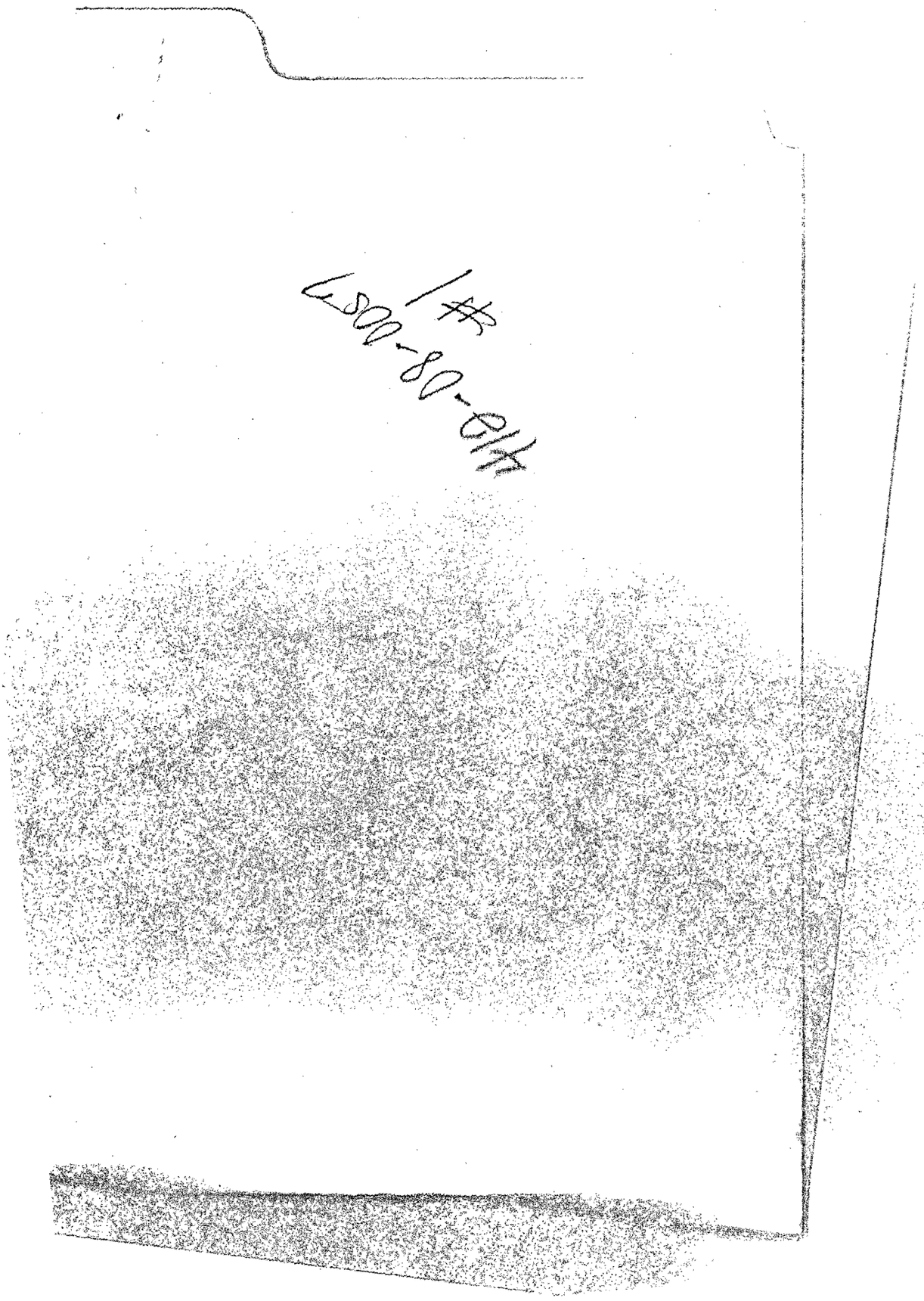


TABLE I

*PRODUCT CHEMICALS FOR PACKAGING AND DISTRIBUTION
VW&R DALLAS ALPHA ROAD SITE
1968 THROUGH SPRING 1986

PRODUCT CHEMICALS STORED IN THE
NORTH CONCRETE CONTAINMENT STRUCTURE

Acetone
n-Butyl Alcohol
Ethylene Glycol Monoethyl Ether Acetate (Cellosolve)
Ethylene Glycol Monobutyl Ether
Hexane
Isopropyl Alcohol
1,1,1-Trichloroethene
Methanol
Methyl Ethyl Ketone (2-butanone)
Methyl Isobutyl Ketone (4-methyl-2-pentanone)
n-Propyl Acetate
Tetrachloroethylene
1,1,1-Trichloroethane
Trichloroethene
Toluene
VMP Naptha
Xylene

Freon
Lacquer Solvent
Mineral Spirits
Solvent 100
Solvent 150
Vansol 200

PRODUCT CHEMICALS STORED IN THE
SOUTH CONCRETE CONTAINMENT STRUCTURE

Aqueous Ammonia (Amonia Hydroxide)
Hydrochloric Acid
Nitric Acid
Sulfuric Acid
Phosphoric Acid (75%)
Acintol (fatty acid)
Caustic Soda (commercial grade)
Caustic Soda (purified)
Caustic Potash
Plasticizer (Benzol Flex 988)
Surfactant (9N9)

*Information conveyed to Glenn L. Draper Engineering by Robert Sheffield, Van Waters & Rogers, Inc., March 18, 1987.

TABLE II

HAZARDOUS SUBSTANCE LIST/MISCELLANEOUS COMPOUNDS

ECOVA CORPORATION
APRIL 7 & 8, 1987

PURGEABLE COMPOUNDS (VOLATILE ORGANICS)
EPA METHODS 624/8240

	Low Level[1] Detection Limit (ug/kg or ug/l)	Medium Level[2] Detection Limit (ug/kg)
Chloromethane	10	1000
Bromomethane	10	1000
Vinyl Chloride	10	1000
Chloroethane	10	1000
Methylene Chloride	5	500
Acetone	10	1000
Carbon Disulfide	5	500
1,1-Dichloroethene	5	500
1,1-Dichloroethane	5	500
1,2-Dichloroethene (total)	5	500
Chloroform	5	500
1,2-Dichloroethane	5	500
2-Butanone	10	1000
1,1,1-Trichloroethane	5	500
Carbon Tetrachloride	5	500
Vinyl Acetate	10	1000
Bromodichloromethane	5	500
1,2-Dichloropropane	5	500
cis-1,3-Cichloropropene	5	500
Trichloroethene	5	500
Dibromochloromethane	5	500
1,1,2-Trichloroethane	5	500
Benzene	5	500
trans-1,3-Dichloropropene	5	500
Bromoform	5	500

TABLE II
(continued)

PURGEABLE COMPOUNDS (VOLATILE ORGANICS)
EPA METHODS 624/8240
(continued)

	Low Level[1] Detection Limit (ug/kg or ug/l)	Medium Level[2] Detection Limit (ug/kg)
4-Methyl-2-Pentanone	10	1000
2-Hexanone	10	1000
Tetrachloroethene	5	500
1,1,2,2-Tetrachloroethane	5	500
Toluene	5	500
Chlorobenzene	5	500
Ethylbenzene	5	500
Styrene	5	500
Xylenes (total)	5	500

TABLE II
(continued)

*BASE/NEUTRAL-ACID EXTRACTABLES (SEMI-VOLATILE ORGANICS)
EPA METHODS 625/8270

	Low Level[3] Detection Limit (ug/kg)
Phenol	330
bis(-2-Chloroethyl)Ether	330
2-Chlorophenol	330
1,3-Dichlorobenzene	330
1,4-Dichlorobenzene	330
Benzyl Alcohol	330
1,2-Dichlorobenzene	330
2-Methylphenol	330
N-Nitroso-di-n-propylamine	330
Hexachloroethane	330
Nitrobenzene	330
Isophorone	330
2-Nitrophenol	330
2,4-Dimethylphenol	330
Benzoic Acid	1600
bis(-2-Chloroethoxy)methane	330
2,4-Dichlorophenol	330
1,2,4-Trichlorobenzene	330
Naphthalene	330
4-Chloroaniline	330
Hexachlorobutadiene	330
4-Chloro-3-methylphenol	330
2-Methylhaphthalene	330
Hexachlorocyclopentadiene	330
2,4,6-Trichlorophenol	330
2,4,5-Trichlorophenol	1600
2-Chloronaphthalene	330
2-Nitroaniline	1600
Dimethylphthalate	330
Acenaphthylene	330
3-Nitroaniline	1600
Acenaphthene	330
2,4-Dinitrophenol	1600
4-Nitrophenol	1600
Dibenzofuran	330
2,4-Dinitrotoluene	330
2,6-Dinitrotoluene	330

TABLE II
(continued)

*BASE/NEUTRAL-ACID EXTRACTABLES (SEMI-VOLATILE ORGANICS)
EPA METHODS 625/8270
(continued)

	Low Level[3] Detection Limit (ug/kg)
4-Chlorophenyl-phenylether	330
Fluorene	330
4-Nitroaniline	330
4,6-Dinitro-2-methylphenol	1600
N-Nitrosodiphenylamine	330
4-Bromophenyl-phenylether	330
Hexachlorobenzene	330
Pentachlorophenol	1600
Phenanthrene	330
Anthracene	330
Di-n-butylphthalate	330
Fluoranthene	330
Pyrene	330
Butylbenzylphthalate	330
3,3'-Dichlorobenzidine	660
Benzo(a)anthracene	330
bis(2-Ethylhexyl)phthalate	330
Chrysene	330
Di-n-octyl phthalate	330
Benzo(b)fluoranthene	330
Benzo(k)fluoranthene	330
Benzo(a)pyrene	330
Ideno(1,2,3-cd)pyrene	330
Dibenzo(a,h)anthracene	330
Benzo(g,h,i)perylene	330

TABLE II
(continued)

ALCOHOL/GLYCOL COMPOUNDS

Methanol
Isopropanol
Butanol
Propylene Glycol

MISCELLANEOUS

pH
Nitrogen as Ammonia (NH_3)
Ignitability

[1]Detection limit based on 5 milliliters (ml) of water (milligrams per liter (mg/l)) or 5 grams (g) of soil (micrograms per kilogram (ug/kg)) uncorrected for percent moisture.

[2]Detection limit for medium level soil (micrograms per liter (ug/kg)) based on 5 g of soil extracted with 10 ml of methanol with 100 microliters (ul) analyzed uncorrected for percent moisture.

[3]Detection limits based on 30 g of soil uncorrected for percent moisture.

*The base/neutral-acid extractable compounds were analyzed only in the following four samples: GD-1 (1.0'-1.25'), GD-3 (12.0'-13.5'), GD-9 (8.0'-9.5'), and GD-12(7.0'-7.5').

TABLE III

*PRIORITY POLLUTANT LIST
VOLATILE ORGANIC CHEMICAL COMPOUNDS

GLENN G. DRAPER ENGINEERING
JULY 20, 1987 AND SEPTEMBER 28, 1987

PURGEABLE COMPOUNDS (VOLATILE ORGANICS)
EPA METHOD 624

	Detection Limit (ug/kg)[1]
Benzene	5.0
Bromoform	5.0
Bromomethane	10.0
Carbon tetrachloride	5.0
Chlorobenzene	5.0
Chlorodibromomethane	5.0
2-Chloroethylvinyl ether	5.0
Chloroethane	10.0
Chloroform	5.0
Chloromethane	10.0
Dichlorobromomethane	5.0
1,2-Dichlorobenzene	5.0
1,3-Dichlorobenzene	5.0
1,4-Dichlorobenzene	5.0
1,1-Dichloroethane	5.0
1,2-Dichloroethane	5.0
1,1-Dichloroethene	5.0
trans-1,2-Dichloroethene	5.0
1,2-Dichloropropane	5.0
cis-1,3-Dichloropropene	5.0
trans-1,2-Dichloropropene	5.0
Ethylbenzene	5.0
Methylene chloride	25.0
1,1,2,2-Tetrachloroethane	5.0
Tetrachloroethene	5.0
Toluene	5.0
1,1,1-Trichloroethane	5.0
1,1,2-Trichloroethane	5.0
Trichloroethene	5.0
Trichlorofluoromethane	10.0
Vinyl Chloride	10.0

TABLE III
(continued)

[1]Micrograms per kilogram

* This list does not represent the complete priority pollutant list. The analyses for semi-volatile organic compounds, metals, and pesticide and dioxin compounds were not requested.

TABLE IV
(continued)

[1] ug/kg - Micrograms per kilogram

[2] mg/kg - Milligrams per kilogram

*This list does not represent the complete priority pollutant list. The pesticide and dioxin compounds were not included for analyses.

TABLE IV
(continued)

ACID EXTRACTABLES
EPA METHOD 8270

	Detection Limit (ug/kg)
4-Chloro-3-methylphenol	150
2-Chlorophenol	150
2,4-Dichlorophenol	150
2,4-Dimethylphenol	150
2,4-Dinitrophenol	1500
2-Methyl-4,6-dinitrophenol	1500
2-Nitrophenol	150
4-Nitrophenol	1500
Pentachlorophenol	1500
Phenol	150
2,4,6-Trichlorophenol	150

METALS (INORGANIC)

	Analytical Method	Detection Limit (mg/kg)[2]
Antimony	3050/200.7	1.0
Arsenic	3050/206.3	0.10
Beryllium	3050/200.7	1.0
Cadmium	3050/200.7	1.0
Chromium	3050/200.7	1.0
Copper	3050/200.7	1.0
Lead	3050/200.7	1.0
Mercury	3050/245.1	0.05
Nickel	3050/200.7	1.0
Selenium	3050/270.3	0.10
Silver	3050/200.7	1.0
Thallium	3050/200.7	1.0
Zinc	3050/200.7	1.0
Cyanide		1.0

TABLE IV
(continued)

BASE/NEUTRAL EXTRACTABLES (SEMI-VOLATILE ORGANICS)
EPA METHOD 8270

	Detection Limit (ug/kg)
Indeno(1,2,3-cd)pyrene	150
Isophorone	150
Naphthalene	150
Nitrobenzene	150
N-Nitrosodimethylamine	150
N-Nitrosodiphenylamine	150
N-Nitrosodi-n-propylamine	150
Phenanthrene	150
Pyrene	150
1,2,4-Trichlorobenzene	150

TABLE IV

*PRIORITY POLLUTANT LIST
ORGANIC/INORGANIC CHEMICAL COMPOUNDS

HARDING LAWSON ASSOCIATES
APRIL 1988

PURGEABLE COMPOUNDS (VOLATILE ORGANICS)
EPA METHOD 624

	Detection Limit (ug/kg)[1]
Benzene	5.0
Bromoform	5.0
Bromomethane	10.0
Carbon tetrachyloride	5.0
Chlorobenzene	5.0
Chlorodibromomethane	5.0
2-Chloroethylvinyl ether	5.0
Chloroethane	10.0
Chloroform	5.0
Chloromethane	10.0
Dichlorobromomethane	5.0
1,2-Dichlorobenzene	5.0
1,3-Dichlorobenzene	5.0
1,4-Dichlorobenzene	5.0
1,1-Dichloroethane	5.0
1,2-Dichloroethane	5.0
1,1-Dichloroethene	5.0
trans-1,2-Dichloroethene	5.0
1,2-Dichloropropane	5.0
cis-1,3-Dichloropropene	5.0
Ethylbenzene	5.0
Methylene chloride	25.0
1,1,2,2-Tetrachloroethane	5.0
Tetrachloroethene	5.0
Toluene	5.0
1,1,1-Trichloroethane	5.0
1,1,2-Trichloroethane	5.0
Trichloroethene	5.0
Trichlorofluoromethane	10.0
Vinyl Chloride	10.0

TABLE IV
(continued)

BASE/NEUTRAL EXTRACTABLES (SEMI-VOLATILE ORGANICS)
EPA METHOD 8270

	Detection Limit (ug/kg)
Acenaphthene	150
Acenaphthylene	150
Anthracene	150
Benzidine	1500
Benzo(a)anthrancene	150
Benzo (b)fluorathene	150
Benzo(k)fluoranthene	150
Benzo(a)pyrene	150
Benzo(ghi)perylene	150
Butyl benzyl phthalate	150
4-Bromophenyl phenyl ether	150
bis(2-Chloroethyl)ether	150
bis(2-Chloroethoxy)methane	150
bis(2-Ethylhexyl)phthalate	150
bis(2-Chloroisopropyl)ether	150
2-Chloronaphthalene	150
4-Chlorophenyl phenyl ether	150
Crysene	150
Dibenzo(a,h)anthracene	150
di-n-Butylphthalate	150
Dichlorobenzenes	150
3,3'-Dichlorobenzidine	600
Diethylphthalate	150
Dimethylphthalate	150
2,4-Dinitrotoluene	150
2,6-Dinotrotoluene	150
di-n-Octylphthalate	150
Dioxin (2,3,7,8-TCDD)	---
1,2-Diphenylhydrazine	150
Fluoranthene	150
Fluorene	150
Hexachlorobenzene	150
Hexachlorobutadiene	150
hexachlorocyclopentadiene	150
Hexachloroethane	150

REFERENCE 1

"Potential Hazardous Waste Site Identification And
Preliminary Assessment Report"
September 30, 1980

MEMORANDUM TO FILE

EPA ID NUMBER: TXD042291591

SITE NAME: Van Waters & Rogers Co.

FILE REOPENED TO CONDUCT SITE INSPECTION PRIORITIZE ON 2/15/91.

Helen Newman
NAME

3-30-91
DATE

Texas Natural Resource Conservation Commission

Wesley Newberry
(512) 239-2512
NEED VERIFY ACTIVE STATUS — 2-page memo.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 6

1445 ROSS AVENUE, SUITE 1200

DALLAS, TEXAS 75202-2733

DATE: July 11, 1990

SUBJECT: FIT Task Request

FROM: William H. Taylor (6H-MA)

TO: Ed Sierra (6E-SH)

X	New Assignment
	Amendment

Please task the FIT to complete the following work:

Key EPA Contact:

Name: Bartolome J. Canellas Phone: 655-6740

Desired Report Format:

___ Formal Report ___ Standard Report ___ Other (Specify):
___ Letter Report ___ Formal Briefing _____

SSID Number: L9ZZ CERID Number: TXD042291591

EPA Site Name: Van Waters & Rogers Company

City/County/State: Dallas/Dallas/Texas

Type of Activity:

___ PA	___ RCRA-PA	X HRS Support	___ Enforc. Support	___ Training
___ SI	___ RCRA-SI	___ QA Support	___ Program Manag.	___ Gen. Tech.
___ LSI	___ Reasses.	___ Spec. Stud.	___ Equip. Main.	Assist.

FIT/SCAP Goal: Will Deliverable Meet a Unit of the Goal? ___ Yes ___ No

Priority: High _____ Medium _____ Low X

General Task Description:
Perform HRS Prescore Analysis for Environmental Priorities Initiative (EPI) site using CERCLA, RCRA, and State files and other easily obtainable information.

Specific Elements:
* Include list and description of Solid Waste Management Units (SWMUs).
* Identify the net worth and most recent annual sales figure for the company that owns the facility.

SUPERFUND FILE

____ Additional Scope Attached

DEC 07 1992

Concurrence: _____ _____ REORGANIZED

Bill Taylor, Chief Heather Schijf

EPA POTENTIAL HAZARDOUS WASTE SITE IDENTIFICATION AND PRELIMINARY ASSESSMENT

REGION: 6 | SITE NUMBER (to be assigned by Hq): TX06203

NOTE: This form is completed for each potential hazardous waste site to help set priorities for site inspection. The information submitted on this form is based on available records and may be updated on subsequent forms as a result of additional inquiries and on-site inspections.

REVIEWED BY: LD Wright 1-9-81

GENERAL INSTRUCTIONS: Complete Sections I and III through X as completely as possible before Section II (*Preliminary Assessment*). File this form in the Regional Hazardous Waste Log File and submit a copy to: U.S. Environmental Protection Agency; Site Tracking System; Hazardous Waste Enforcement Task Force (*EN-335*); 401 M St., SW; Washington, DC 20460.

I. SITE IDENTIFICATION

A. SITE NAME: Van Waters and Rogers Company

B. STREET (or other identifier): 4707 Alpha Road, P.O. Box 34749

C. CITY: Dallas

D. STATE: Texas

E. ZIP CODE: 75234

F. COUNTY NAME: Dallas -113-

G. OWNER/OPERATOR (If known)
1. NAME: Jim Helm - Warehouse Manager
Phil Lonear - Area Manager / Fred Herald - Operations Manager
2. TELEPHONE NUMBER: 214-239-9111

H. TYPE OF OWNERSHIP
☐ 1. FEDERAL ☐ 2. STATE ☐ 3. COUNTY ☐ 4 MUNICIPAL ☒ 5 PRIVATE ☐ 6 UNKNOWN

I. SITE DESCRIPTION
Distributer of solvents, corrosives, and various industrial chemicals
Recycler of solvents; Manufacture Aqua Ammonia

J. HOW IDENTIFIED (i.e., citizen's complaints, OSHA citations, etc.)
Application for TDWR registration

K. DATE IDENTIFIED (mo., day, & yr.): 9-24-79

L. PRINCIPAL STATE CONTACT
1. NAME: Gary Schroeder
2. TELEPHONE NUMBER: 512-475-6371

II. PRELIMINARY ASSESSMENT (complete this section last)

A. APPARENT SERIOUSNESS OF PROBLEM
☐ 1. HIGH ☐ 2. MEDIUM ☐ 3. LOW ☒ 4 NONE ☐ 5 UNKNOWN

TXD042291591

B. RECOMMENDATION
☒ 1. NO ACTION NEEDED (no hazard)
☐ 2. IMMEDIATE SITE INSPECTION NEEDED
a. TENTATIVELY SCHEDULED FOR: SUPERFUND FILE
b. WILL BE PERFORMED BY:
☐ 3. SITE INSPECTION NEEDED
a. TENTATIVELY SCHEDULED FOR:
b. WILL BE PERFORMED BY:
☐ 4. SITE INSPECTION NEEDED (low priority)

DEC 07 1992
REORGANIZED

C. PREPARER INFORMATION
1. NAME: Glenda J. Thomas
2. TELEPHONE NUMBER: 214-298-6171
3. DATE (mo., day, & yr.): 09-30-80

III. SITE INFORMATION

A. SITE STATUS
☒ 1. ACTIVE (*Those industrial or municipal sites which are being used for waste treatment, storage, or disposal on a continuing basis, even if intermittently.*)
☐ 2. INACTIVE (*Those sites which no longer receive wastes.*)
☐ 3. OTHER (*specify*): _____ (*Those sites that include such incidents like "midnight dumping" where no regular or continuing use of the site for waste disposal has occurred.*)

B. IS GENERATOR ON SITE?
☐ 1. NO ☒ 2. YES (*specify generator's four-digit SIC Code*): Not Available

C. AREA OF SITE (*in acres*): 3 acres

D. IF APPARENT SERIOUSNESS OF SITE IS HIGH, SPECIFY COORDINATES
1. LATITUDE (deg.-min.-sec.): 96° 49'
2. LONGITUDE (deg.-min.-sec.): 32° 56'

E. ARE THERE BUILDINGS ON THE SITE?
☐ 1. NO ☒ 2. YES (*specify*): 1 main facility (offices, warehouse, drum storage yard, storage tanks)

Continue On Reverse

Continued From Front

CHARACTERIZATION OF SITE ACTIVIT

Indicate the major site activity(ies) and details relating to each activity by marking 'X' in the appropriate boxes.

X	A. TRANSPORTER	X	B. STORER	X	C. TREATER	X	D. DISPOSER
	1. RAIL		1. PILE		1. FILTRATION		1. LANDFILL
	2. SHIP		2. SURFACE IMPOUNDMENT		2. INCINERATION		2. LANDFARM
	3. BARGE	X	3. DRUMS		3. VOLUME REDUCTION		3. OPEN DUMP
X	4. TRUCK		4. TANK, ABOVE GROUND		4. RECYCLING/RECOVERY		4. SURFACE IMPOUNDMENT
	5. PIPELINE		5. TANK, BELOW GROUND		5. CHEM./PHYS. TREATMENT		5. MIDNIGHT DUMPING
	6. OTHER (specify):		6. OTHER (specify):		6. BIOLOGICAL TREATMENT		6. INCINERATION
					7. WASTE OIL REPROCESSING		7. UNDERGROUND INJECTION
				X	8. SOLVENT RECOVERY	X	8. OTHER (specify): off-site, approved disposal site
					9. OTHER (specify):		

E. SPECIFY DETAILS OF SITE ACTIVITIES AS NEEDED

The solvent recycling sludge is a result of the distillation process in which they use to recycle solvents. The sludge forms at the tank bottom, and when they remove it, they store it in drums until it is sent to an approved disposal site. The mixed solvents, that result from these cleanouts, are stored in drums also.

V. WASTE RELATED INFORMATION

A. WASTE TYPE

☐ 1 UNKNOWN ☒ 2. LIQUID ☐ 3. SOLID ☒ 4. SLUDGE ☐ 5. GAS

B. WASTE CHARACTERISTICS

☐ 1 UNKNOWN ☐ 2. CORROSIVE ☐ 3. IGNITABLE ☐ 4 RADIOACTIVE ☐ 5 HIGHLY VOLATILE
☒ 6 TOXIC ☐ 7 REACTIVE ☒ 8. INERT ☐ 9 FLAMMABLE

☐ 10. OTHER (specify):

C. WASTE CATEGORIES

1. Are records of wastes available? Specify items such as manifests, inventories, etc. below.

Yes, manifests

2. Estimate the amount (specify unit of measure) of waste by category; mark 'X' to indicate which wastes are present.

a. SLUDGE	b. OIL	c. SOLVENTS	d. CHEMICALS	e. SOLIDS	f. OTHER
AMOUNT 20	AMOUNT	AMOUNT 5	AMOUNT	AMOUNT	AMOUNT
UNIT OF MEASURE drums	UNIT OF MEASURE	UNIT OF MEASURE drums	UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE
X (1) PAINT, PIGMENTS	X (1) OILY WASTES	X (1) HALOGENATED SOLVENTS	X (1) ACIDS	X (1) FLYASH	X (1) LABORATORY PHARMACEUT.
(2) METALS SLUDGES	(2) OTHER (specify):	X (2) NON-HALOGNTD SOLVENTS	(2) PICKLING LIQUORS	(2) ASBESTOS	(2) HOSPITAL
(3) POTW		(3) OTHER (specify):	(3) CAUSTICS	(3) MILLING/ MINE TAILINGS	(3) RADIOACTIVE
(4) ALUMINUM SLUDGE			(4) PESTICIDES	(4) FERROUS SMLTG. WASTES	(4) MUNICIPAL
X (5) OTHER (specify): Solvent recycling sludge			(5) DYES/INKS	(5) NON-FERROUS SMLTG. WASTES	(5) OTHER (specify):
			(6) CYANIDE	(6) OTHER (specify):	
			(7) PHENOLS		
			(8) HALOGENS		
			(9) PCB		
			(10) METALS		
			(11) OTHER (specify)		

Continue On Page 3

...ntinued From Page 2

WASTE RELATED INFORMATION (continu...

3. LIST SUBSTANCES OF GREATEST CONCERN WHICH MAY BE ON THE SITE *(place in descending order of hazard)*.

Mixed solvents from hose cleanouts
Solvent recycling sludge

4. ADDITIONAL COMMENTS OR NARRATIVE DESCRIPTION OF SITUATION KNOWN OR REPORTED TO EXIST AT THE SITE.

Company stores wastes for less than 90 days

VI. HAZARD DESCRIPTION

A. TYPE OF HAZARD	B. POTENTIAL HAZARD *(mark 'X')*	C. ALLEGED INCIDENT *(mark 'X')*	D. DATE OF INCIDENT *(mo., day, yr.)*	E. REMARKS
1. NO HAZARD				
2. HUMAN HEALTH				
3. NON-WORKER INJURY/EXPOSURE				
4. WORKER INJURY				
5. CONTAMINATION OF WATER SUPPLY				
6. CONTAMINATION OF FOOD CHAIN				
7. CONTAMINATION OF GROUND WATER				
8. CONTAMINATION OF SURFACE WATER				
9. DAMAGE TO FLORA/FAUNA				
10. FISH KILL				
11. CONTAMINATION OF AIR				
12. NOTICEABLE ODORS				
13. CONTAMINATION OF SOIL				
14. PROPERTY DAMAGE				
15. FIRE OR EXPLOSION				
16. SPILLS/LEAKING CONTAINERS/ RUNOFF/STANDING LIQUIDS				
17. SEWER, STORM DRAIN PROBLEMS				
18. EROSION PROBLEMS				
19. INADEQUATE SECURITY				
20. INCOMPATIBLE WASTES				
21. MIDNIGHT DUMPING				
22. OTHER *(specify)*: See Site Description page attached.				

Continued From Front

VII. PERMIT INFORMATION

A. INDICATE ALL APPLICABLE PERMITS HELD BY THE SITE.

☐ 1. NPDES PERMIT ☐ 2. SPCC PLAN ☒ 3. STATE PERMIT (specify) Registration # 31657
☐ 4. AIR PERMITS ☐ 5. LOCAL PERMIT ☐ 6. RCRA TRANSPORTER
☐ 7. RCRA STORER ☐ 8. RCRA TREATER ☐ 9. RCRA DISPOSER

☐ 10. OTHER (specify): _____

B. IN COMPLIANCE?

☒ 1. YES ☐ 2. NO ☐ 3. UNKNOWN

C. WITH RESPECT TO (list regulation name & number): TSWP Registration # 31657

VIII. PAST REGULATORY ACTIONS

☒ A. NONE ☐ B. YES (summarize below)

IX. INSPECTION ACTIVITY (past or on-going)

A. NONE ☒ B. YES (complete items 1, 2, 3, & 4 below)

1. TYPE OF ACTIVITY	2. DATE OF PAST ACTION (mo., day, & yr.)	3. PERFORMED BY: (EPA/State)	4. DESCRIPTION
Annual Inspection	09-30-80	State	Inspected internal operational records and drum storage area.

X. REMEDIAL ACTIVITY (past or on-going)

☒ A. NONE ☐ B. YES (complete items 1, 2, 3, & 4 below)

1. TYPE OF ACTIVITY	2. DATE OF PAST ACTION (mo., day, & yr.)	3. PERFORMED BY: (EPA/State)	4. DESCRIPTION

NOTE: Based on the information in Sections III through X, fill out the Preliminary Assessment (Section II) information on the first page of this form.

SITE DESCRIPTION

Make additional comments or narrative description of situation known or reported to exist at the site based on file review. Include dates and description of any incidents documented in file.

No Potential or Known Hazards Present.

REFERENCE 2

"Potential Hazardous Waste Site Identification Report"
with Attachments A and B
January 17, 1984.

2/8/84

EPA

POTENTIAL HAZARDOUS WASTE SITE
IDENTIFICATION AND PRELIMINARY ASSESSMENT

REGION	SITE NUMBER (To be assigned by Hq)
6	TX06203

NOTE: This form is completed for each potential hazardous waste site to help set priorities for site inspection. The information submitted on this form is based on available records and may be updated on subsequent forms as a result of additional inquiries and on-site inspections.

GENERAL INSTRUCTIONS: Complete Sections I and III through X as completely as possible before Section II (*Preliminary Assessment*). File this form in the Regional Hazardous Waste Log File and submit a copy to: U.S. Environmental Protection Agency; Site Tracking System; Hazardous Waste Enforcement Task Force (*EN-335*); 401 M St., SW; Washington, DC 20460.

I. SITE IDENTIFICATION

A. SITE NAME	B. STREET (or other identifier)		
Van Waters and Rogers Company	4707 Alpha Rd., P.O. Box 34749		
C. CITY	**D. STATE**	**E. ZIP CODE**	**F. COUNTY NAME**
Dallas	TX	75234	Dallas

G. OWNER/OPERATOR (*If known*)

1. NAME	2. TELEPHONE NUMBER
Van Waters and Rogers, Division of Univor (Jim Helm, Whse Mgr.)	(214) 234-9111

H. TYPE OF OWNERSHIP

☐ 1. FEDERAL ☐ 2. STATE ☐ 3. COUNTY ☐ 4. MUNICIPAL ☒ 5. PRIVATE ☐ 6. UNKNOWN

I. SITE DESCRIPTION

The site is a warehouse/distribution facility for various kinds of chemicals. A large number of tanks and drums full of raw materials and products are (see Attachment A).

J. HOW IDENTIFIED (*I.e., citizen's complaints, OSHA citations, etc.*)	K. DATE IDENTIFIED (*mo., day, & yr.*)
Notified under RCRA	9/24/79

L. PRINCIPAL STATE CONTACT

1. NAME	2. TELEPHONE NUMBER
Dan Scheppers, TDWR	(512) 475-1344

II. PRELIMINARY ASSESSMENT (*complete this section last*)

A. APPARENT SERIOUSNESS OF PROBLEM

☐ 1. HIGH ☐ 2. MEDIUM ☐ 3. LOW ☒ 4. NONE ☐ 5. UNKNOWN

TXD042291591

B. RECOMMENDATION

☒ 1. NO ACTION NEEDED (*no hazard*)

☐ 2. IMMEDIATE SITE INSPECTION NEEDED
a. TENTATIVELY SCHEDULED FOR: _____
b. WILL BE PERFORMED BY: _____

☐ 3. SITE INSPECTION NEEDED
a. TENTATIVELY SCHEDULED FOR: _____
b. WILL BE PERFORMED BY: _____

SUPERFUND FILE
DEC 14 1992
REORGANIZED

☐ 4. SITE INSPECTION NEEDED (*low priority*)

4/16/84

C. PREPARER INFORMATION

1. NAME	2. TELEPHONE NUMBER	3. DATE (*mo., day, & yr.*)
David R. Wilkes, Engineering-Science, Inc.	(512) 477-9901	~~1/17/84~~

III. SITE INFORMATION

A. SITE STATUS

☒ 1. ACTIVE (*Those industrial or municipal sites which are being used for waste treatment, storage, or disposal on a continuing basis, even if intermittently.*) (see Attachment A)

☐ 2. INACTIVE (*Those sites which no longer receive wastes.*)

☐ 3. OTHER (*specify*): _____ (*Those sites that include such incidents like "midnight dumping" where no regular or continuing use of the site for waste disposal has occurred.*)

B. IS GENERATOR ON SITE?

☐ 1. NO ☒ 2. YES (*specify generator's four-digit SIC Code*): 5161

C. AREA OF SITE (*In acres*)	D. IF APPARENT SERIOUSNESS OF SITE IS HIGH, SPECIFY COORDINATES	
	1. LATITUDE (*deg.-min.-sec.*)	2. LONGITUDE (*deg.-min.-sec.*)
11.25	N 32°56'00"	W 96°49'45"

E. ARE THERE BUILDINGS ON THE SITE?

☐ 1. NO ☒ 2. YES (*specify*): Warehouse, offices, and covered storage area

RETURNED BY AEGIS 4/16/84 DATE

Continue On Reverse

Continued From Front

V. CHARACTERIZATION OF SITE ACTIVITIES

Indicate the major site activity(ies) and details relating to each activity by marking 'X' in the appropriate boxes.

A. TRANSPORTER	B. STORER	C. TREATER	D. DISPOSER
X 1. RAIL	1. PILE	1. FILTRATION	1. LANDFILL
2. SHIP	2. SURFACE IMPOUNDMENT	2. INCINERATION	2. LANDFARM
3. BARGE	X 3. DRUMS	3. VOLUME REDUCTION	3. OPEN DUMP
X 4. TRUCK	4. TANK, ABOVE GROUND	4. RECYCLING/RECOVERY	4. SURFACE IMPOUNDMENT
5. PIPELINE	5. TANK, BELOW GROUND	5. CHEM./PHYS. TREATMENT	5. MIDNIGHT DUMPING
6. OTHER (specify):	6. OTHER (specify):	6. BIOLOGICAL TREATMENT	6. INCINERATION
		7. WASTE OIL REPROCESSING	7. UNDERGROUND INJECTION
		X 8. SOLVENT RECOVERY	8. OTHER (specify):
		X 9. OTHER (specify): Neutralization	

E. SPECIFY DETAILS OF SITE ACTIVITIES AS NEEDED This site is located in the Cotton Belt Railroad Metropolitan Industrial Park in Farmers Branch, an area with active commercial/industrial facilities. There are numerous storage areas (both drums and tanks) on the site, but most of these are not wastes but product. The waste-handling operations consist of a neutralization tank for treatment of corrosive wastes (D002). (see Attachment A)

V. WASTE RELATED INFORMATION

A. WASTE TYPE

☐ 1. UNKNOWN ☒ 2. LIQUID ☐ 3. SOLID ☒ 4. SLUDGE ☐ 5. GAS

B. WASTE CHARACTERISTICS

☐ 1. UNKNOWN ☒ 2. CORROSIVE ☒ 3. IGNITABLE ☐ 4. RADIOACTIVE ☐ 5. HIGHLY VOLATILE
☒ 6. TOXIC ☐ 7. REACTIVE ☐ 8. INERT ☐ 9. FLAMMABLE

☐ 10. OTHER (specify): _____

C. WASTE CATEGORIES

1. Are records of wastes available? Specify items such as manifests, inventories, etc. below.

Yes, manifests from off-site disposal

2. Estimate the amount (specify unit of measure) of waste by category; mark 'X' to indicate which wastes are present.

a. SLUDGE	b. OIL	c. SOLVENTS	d. CHEMICALS	e. SOLIDS	f. OTHER
AMOUNT: 7	AMOUNT: None	AMOUNT: 36,000	AMOUNT: see Attachment A	AMOUNT: None	AMOUNT: None
UNIT OF MEASURE: 55-gal drums/month	UNIT OF MEASURE:	UNIT OF MEASURE: kg/year	UNIT OF MEASURE:	UNIT OF MEASURE:	UNIT OF MEASURE:
☐ (1) PAINT, PIGMENTS	☐ (1) OILY WASTES	☐ (1) HALOGENATED SOLVENTS	☐ (1) ACIDS	☐ (1) FLYASH	☐ (1) LABORATORY PHARMACEUT.
☐ (2) METALS SLUDGES	☐ (2) OTHER (specify):	X (2) NON-HALOGNTD. SOLVENTS	☐ (2) PICKLING LIQUORS	☐ (2) ASBESTOS	☐ (2) HOSPITAL
☐ (3) POTW		☐ (3) OTHER (specify): solvent recycling	☐ (3) CAUSTICS	☐ (3) MILLING/ MINE TAILINGS	☐ (3) RADIOACTIVE
☐ (4) ALUMINUM SLUDGE			☐ (4) PESTICIDES	☐ (4) FERROUS SMLTG. WASTES	☐ (4) MUNICIPAL
X (5) OTHER (specify): spent halo-genated solvent sludge			☐ (5) DYES/INKS	☐ (5) NON-FERROUS SMLTG. WASTES	☐ (5) OTHER (specify):
			☐ (6) CYANIDE	☐ (6) OTHER (specify):	
			☐ (7) PHENOLS		
			☐ (8) HALOGENS		
			☐ (9) PCB		
			☐ (10) METALS		
			X (11) OTHER (specify): various chemicals		

Continued From Page 2

V. WASTE RELATED INFORMATION (continued)

3. LIST SUBSTANCES OF GREATEST CONCERN WHICH MAY BE ON THE SITE (place in descending order of hazard).

Various toxic organic chemicals
Non-halogenated solvents
Solvent sludge

4. ADDITIONAL COMMENTS OR NARRATIVE DESCRIPTION OF SITUATION KNOWN OR REPORTED TO EXIST AT THE SITE.

VI. HAZARD DESCRIPTION

A. TYPE OF HAZARD	B. POTENTIAL HAZARD (mark 'X')	C. ALLEGED INCIDENT (mark 'X')	D. DATE OF INCIDENT (mo., day, yr.)	E. REMARKS
1. NO HAZARD	X			
2. HUMAN HEALTH				
3. NON-WORKER INJURY/EXPOSURE				
4. WORKER INJURY				
5. CONTAMINATION OF WATER SUPPLY				
6. CONTAMINATION OF FOOD CHAIN				
7. CONTAMINATION OF GROUND WATER				
8. CONTAMINATION OF SURFACE WATER				
9. DAMAGE TO FLORA/FAUNA				
10. FISH KILL				
11. CONTAMINATION OF AIR				
12. NOTICEABLE ODORS				
13. CONTAMINATION OF SOIL				
14. PROPERTY DAMAGE				
15. FIRE OR EXPLOSION				
16. SPILLS/LEAKING CONTAINERS/ RUNOFF/STANDING LIQUIDS				
17. SEWER, STORM DRAIN PROBLEMS				
18. EROSION PROBLEMS				
19. INADEQUATE SECURITY				
20. INCOMPATIBLE WASTES				
21. MIDNIGHT DUMPING				
22. OTHER (specify):				

Continued From Front

VII. PERMIT INFORMATION

A. INDICATE ALL APPLICABLE PERMITS HELD BY THE SITE.

- [ ] 1. NPDES PERMIT
- [ ] 2. SPCC PLAN
- [ ] 3. STATE PERMIT (specify):
- [ ] 4. AIR PERMITS
- [ ] 5. LOCAL PERMIT
- [X] 6. RCRA TRANSPORTER
- [X] 7. RCRA STORER
- [X] 8. RCRA TREATER
- [ ] 9. RCRA DISPOSER
- [X] 10. OTHER (specify): EPA ID No. TXD042291591, Solid Waste Registration No. (TDWR) 31657

B. IN COMPLIANCE?

- [ ] 1. YES
- [ ] 2. NO
- [X] 3. UNKNOWN

4. WITH RESPECT TO (list regulation name & number):

VIII. PAST REGULATORY ACTIONS

- [X] A. NONE
- [ ] B. YES (summarize below)

IX. INSPECTION ACTIVITY (past or on-going)

- [ ] A. NONE
- [X] B. YES (complete items 1,2,3, & 4 below)

1. TYPE OF ACTIVITY	2. DATE OF PAST ACTION (mo., day, & yr.)	3. PERFORMED BY: (EPA/State)	4. DESCRIPTION
Site inspection	9/30/80	State, TDWR	Site inspection for the PA. Inspection of facilities and records
Site inspection	12/83	State, TDWR	RCRA compliance inspection

X. REMEDIAL ACTIVITY (past or on-going)

- [X] A. NONE
- [ ] B. YES (complete items 1, 2, 3, & 4 below)

1. TYPE OF ACTIVITY	2. DATE OF PAST ACTION (mo., day, & yr.)	3. PERFORMED BY: (EPA/State)	4. DESCRIPTION

NOTE: Based on the information in Sections III through X, fill out the Preliminary Assessment (Section II) information on the first page of this form.

ATTACHMENT A

POTENTIAL HAZARDOUS WASTE SITE
IDENTIFICATION AND PRELIMINARY ASSESSMENT SUPPLEMENT SHEET

Instruction - This sheet is provided to give additional information in explanation of a question on the form T2070-2.

Corresponding number on form	Additional Remark and/or Explanation
I-I	on the site. A drum storage area for wastes is also on the site.
III-A	The site has been operating since 8/4/69.
IV-E	a steam distillation system for recycling spent halogenated solvents, and a drum storage area. The drum storage facility is a fenced concrete storage area for short-term storage of returned 55-gallon drums of solvent before recycling and interim storage of recycling sludge before off-site disposal. This facility has a capacity of about 100 55-gallon drums. Off-site disposal in the past (before 1979) was provided by Bio-Ecology and Dal-Worth Industries. All off-site shipments are manifested properly. There are no inactive facilities on the site, although the solvent recovery system may be operated intermittently. Product storage areas are bermed (tanks) and on concrete pads (drums) so that any spills should be controlled adequately. The site was given interim status by EPA under RCRA for treatment of waste F002 (solvent recovery) and D002 (neutralization) as well as for the drum storage area for various solvent wastes. The facility attempts to meet the 90-day storage exclusion rule under RCRA for their drum storage area, but they obtained interim status for it in case they needed to store for greater than 90 days. The recent (12/83) RCRA inspection resulted in questions only about the solvent recycling process. No other problems were noted. No further action is recommended because of the recent inspection activity by the TDWR and because of the active status of all waste-handling facilities.
V-C-2-d	The following list contains those compounds that would become wastes only if spilled, contaminated, or off-specification: U002 U210 U037 U069 U134 U213 P035 U031 U220 U043 U107 U140 U219 P044 U112 U226 U044 U100 U165 P009 P049 U154 U228 U052 U122 U171 P022 P051 U159 U239 U054 U123 U188 P029 P059 U161 U036 U057 U133 U197 P030 P066 P090 P096 P098 P104 P106 P108 P115 P117 P121

ATTACHMENT B

REJECTION FORM

HAZSIT #	SITE NAME	FORM # and DATE COMPLETED by STATE
TX 6203	VAN WATERS AND ROGERS COMPANY	T2070-2 1/17/84

EXPLANATION FOR REJECTION:
(DEFICIENCIES)

Section III (B)
- NO SIC Code

SUGGESTED REMEDY FOR
DEFICIENCIES:

Reference the State Index of Manufacturers

SIGNATURE: A. J. Gardner
NAME OF REVIEWER

DATE: 2/24/84

TXD 042 291 591

REFERENCE 3

"PA-Score for the Van Waters and Rogers site"
with panoramic photos of storage areas on site
January 17, 1984.

OMB Approval Number: 2050-0095
Approved for Use Through: 4/95

PA-Score

PA Scoresheets

Site Name: Van Waters and Rogers Company
CERCLIS ID No.: TXD042291591
Street Address: 4707 Alpha Rd., P.O. Box 34749
City/State/Zip: Dallas, TX 75234

Investigator: David R. Wilkes
Agency/Organization: Engineering-Science, Inc.
Street Address:
City/State: ,

Date: 1-17-84

WASTE CHARACTERISTICS

Waste Characteristics (WC) Calculations:

1 sludge	Drums	Ref: 1	WQ value	maximum
Volume	7.00E+00 drums		7.00E-01	7.00E-01

Estimate of 7, 55 gal. drums of spent halogenated solvent sludge per month.
Ref: 1

2 solvents	Other	Ref: 1	WQ value	maximum
Volume	2.00E+00 cu yds		8.00E-01	8.00E-01

Estimated 36,000 kg/yr. generated from solvent recycling.
Ref: 1

WQ total 1.50E+00

** Only First WC Page Is Printed **

Waste Characteristics Score: WC = 18

Ground Water Pathway Criteria List Suspected Release	
Are sources poorly contained? (y/n/u)	N
Is the source a type likely to contribute to ground water contamination (e.g., wet lagoon)? (y/n/u)	U
Is waste quantity particularly large? (y/n/u)	U
Is precipitation heavy? (y/n/u)	U
Is the infiltration rate high? (y/n/u)	U
Is the site located in an area of karst terrain? (y/n)	N
Is the subsurface highly permeable or conductive? (y/n/u)	U
Is drinking water drawn from a shallow aquifer? (y/n/u)	U
Are suspected contaminants highly mobile in ground water? (y/n/u)	U
Does analytical or circumstantial evidence suggest ground water contamination? (y/n/u)	N
Other criteria? (y/n) N	
SUSPECTED RELEASE? (y/n)	N

Summarize the rationale for Suspected Release:

Ground Water Pathway Criteria List
Primary Targets

Is any drinking water well nearby? (y/n/u)

Has any nearby drinking water well been closed? (y/n/u)

Has any nearby drinking water well user reported foul-testing or foul-smelling water? (y/n/u)

Does any nearby well have a large drawdown/high production rate? (y/n/u)

Is any drinking water well located between the site and other wells that are suspected to be exposed to a hazardous substance? (y/n/u)

Does analytical or circumstantial evidence suggest contamination at a drinking water well? (y/n/u)

Does any drinking water well warrant sampling? (y/n/u)

Other criteria? (y/n)

PRIMARY TARGET(S) IDENTIFIED? (y/n)

Summarize the rationale for Primary Targets:

GROUND WATER PATHWAY SCORESHEETS

Pathway Characteristics

		Ref.
Do you suspect a release? (y/n)	No	
Is the site located in karst terrain? (y/n)	No	
Depth to aquifer (feet):	0	
Distance to the nearest drinking water well (feet):	0	

LIKELIHOOD OF RELEASE	Suspected Release	No Suspected Release	References
1. SUSPECTED RELEASE	0		
2. NO SUSPECTED RELEASE		500	
LR =	0	500	

Targets

TARGETS	Suspected Release	No Suspected Release	References
3. PRIMARY TARGET POPULATION 0 person(s)	0		
4. SECONDARY TARGET POPULATION Are any wells part of a blended system? (y/n) N	0	0	
5. NEAREST WELL	0	0	
6. WELLHEAD PROTECTION AREA None within 4 Miles	0	0	
7. RESOURCES	0	5	
T =	0	5	

WASTE CHARACTERISTICS

WC =	0	18

GROUND WATER PATHWAY SCORE:	1

Ground Water Target Populations

Primary Target Population Drinking Water Well ID	Dist. (miles)	Population Served	Reference	Value
None				

*** Note : Maximum of 5 Wells Are Printed *** Total

Secondary Target Population Distance Categories	Population Served	Reference	Value
0 to 1/4 mile	0		0
Greater than 1/4 to 1/2 mile	0		0
Greater than 1/2 to 1 mile	0		0
Greater than 1 to 2 miles	0		0
Greater than 2 to 3 miles	0		0
Greater than 3 to 4 miles	0		0
		Total	0

Apportionment Documentation for a Blended System

Surface Water Pathway Criteria List Suspected Release	
Is surface water nearby? (y/n/u)	U
Is waste quantity particularly large? (y/n/u)	N
Is the drainage area large? (y/n/u)	U
Is rainfall heavy? (y/n/u)	U
Is the infiltration rate low? (y/n/u)	U
Are sources poorly contained or prone to runoff or flooding? (y/n/u)	U
Is a runoff route well defined(e.g.ditch/channel to surf.water)? (y/n/u)	U
Is vegetation stressed along the probable runoff path? (y/n/u)	U
Are sediments or water unnaturally discolored? (y/n/u)	U
Is wildlife unnaturally absent? (y/n/u)	U
Has deposition of waste into surface water been observed? (y/n/u)	N
Is ground water discharge to surface water likely? (y/n/u)	U
Does analytical/circumstantial evidence suggest S.W. contam? (y/n/u)	U
Other criteria? (y/n) N	
SUSPECTED RELEASE? (y/n)	N

Summarize the rationale for Suspected Release:

Surface Water Pathway Criteria List
Primary Targets

Is any target nearby? (y/n/u) If yes: N
- U Drinking water intake
- N Fishery
- N Sensitive environment

Has any intake, fishery, or recreational area been closed? (y/n/u) N

Does analytical or circumstantial evidence suggest surface water contamination at or downstream of a target? (y/n/u) N

Does any target warrant sampling? (y/n/u) If yes: N
- U Drinking water intake
- N Fishery
- N Sensitive environment

Other criteria? (y/n) N

PRIMARY INTAKE(S) IDENTIFIED? (y/n) N

Summarize the rationale for Primary Intakes:

continued -------

continued -------

Other criteria? (y/n) N

PRIMARY FISHERY(IES) IDENTIFIED? (y/n) N

Summarize the rationale for Primary Fisheries:

Other criteria? (y/n) N

PRIMARY SENSITIVE ENVIRONMENT(S) IDENTIFIED? (y/n) N

Summarize the rationale for Primary Sensitive Environments:

SURFACE WATER PATHWAY SCORESHEETS

Pathway Characteristics		Ref.
Do you suspect a release? (y/n)	No	
Distance to surface water (feet):	0	
Flood frequency (years):	1-10	
What is the downstream distance (miles) to: a. the nearest drinking water intake? b. the nearest fishery? c. the nearest sensitive environment?	 0.0 0.0 0.0	

LIKELIHOOD OF RELEASE	Suspected Release	No Suspected Release	References
1. SUSPECTED RELEASE	0		
2. NO SUSPECTED RELEASE		500	
LR =	0	500	

Drinking Water Threat Targets

TARGETS	Suspected Release	No Suspected Release	References
3. Determine the water body type, flow (if applicable), and number of people served by each drinking water intake.			
4. PRIMARY TARGET POPULATION 0 person(s)	0		
5. SECONDARY TARGET POPULATION Are any intakes part of a blended system? (y/n): N	0	0	
6. NEAREST INTAKE	0	0	
7. RESOURCES	0	5	
T =	0	5	

Drinking Water Threat Target Populations

Intake Name	Primary (y/n)	Water Body Type/Flow	Population Served	Ref.	Value
None					

Total Primary Target Population Value	0
Total Secondary Target Population Value	0

*** Note : Maximum of 6 Intakes Are Printed ***

Apportionment Documentation for a Blended System

Human Food Chain Threat Targets

TARGETS	Suspected Release	No Suspected Release	References
8. Determine the water body type and flow for each fishery within the target limit.			
9. PRIMARY FISHERIES	0		
10. SECONDARY FISHERIES	0	0	
T =	0	0	

Human Food Chain Threat Targets

Fishery Name	Primary (y/n)	Water Body Type/Flow	Ref.	Value
None				

Total Primary Fisheries Value	0
Total Secondary Fisheries Value	0

*** Note : Maximum of 6 Fisheries Are Printed ***

Environmental Threat Targets

TARGETS	Suspected Release	No Suspected Release	References
11. Determine the water body type and flow (if applicable) for each sensitive environment.			
12. PRIMARY SENSITIVE ENVIRONMENTS	0		
13. SECONDARY SENSITIVE ENVIRONS.	0	0	
T =	0	0	

Environmental Threat Targets

Sensitive Environment Name	Primary (y/n)	Water Body Type/Flow	Ref.	Value
None				

Total Primary Sensitive Environments Value	0
Total Secondary Sensitive Environments Value	0

*** Note: Maximum of 6 Sensitive Environments Are Printed ***

Surface Water Pathway Threat Scores

Threat	Likelihood of Release(LR) Score	Targets(T) Score	Pathway Waste Characteristics (WC) Score	Threat Score LR x T x WC / 82,500
Drinking Water	500	5	18	1
Human Food Chain	500	0	18	0
Environmental	500	0	18	0

SURFACE WATER PATHWAY SCORE: 1

Soil Exposure Pathway Criteria List
Resident Population

Is any residence, school, or daycare facility on or within 200 feet of an area of suspected contamination? (y/n/u)	N
Is any residence, school, or daycare facility located on adjacent land previously owned or leased by the site owner/operator? (y/n/u)	N
Is there a migration route that might spread hazardous substances near residences, schools, or daycare facilities? (y/n/u)	U
Have onsite or adjacent residents or students reported adverse health effects, exclusive of apparent drinking water or air contamination problems? (y/n/u)	N
Does any neighboring property warrant sampling? (y/n/u)	U

Other criteria? (y/n) N

RESIDENT POPULATION IDENTIFIED? (y/n) N

Summarize the rationale for Resident Population:

SOIL EXPOSURE PATHWAY SCORESHEETS

Pathway Characteristics

		Ref.
Do any people live on or within 200 ft of areas of suspected contamination? (y/n)	No	
Do any people attend school or daycare on or within 200 ft of areas of suspected contamination? (y/n)	No	
Is the facility active? (y/n):	Yes	1

LIKELIHOOD OF EXPOSURE	Suspected Contamination	References
1. SUSPECTED CONTAMINATION LE =	550	

Targets

2. RESIDENT POPULATION 0 resident(s) 0 school/daycare student(s)	0	
3. RESIDENT INDIVIDUAL	0	
4. WORKERS None	0	
5. TERRES. SENSITIVE ENVIRONMENTS	0	
6. RESOURCES	5	
T =	5	

WASTE CHARACTERISTICS

WC = 18

RESIDENT POPULATION THREAT SCORE: 1

NEARBY POPULATION THREAT SCORE: 1

Population Within 1 Mile: 1 - 10,000

SOIL EXPOSURE PATHWAY SCORE: 2

Soil Exposure Pathway Terrestrial Sensitive Environments

Terrestrial Sensitive Environment Name	Reference	Value
None		

Total Terrestrial Sensitive Environments Value

*** Note : Maximum of 7 Sensitive Environments Are Printed ***

Air Pathway Criteria List Suspected Release	
Are odors currently reported? (y/n/u)	N
Has release of a hazardous substance to the air been directly observed? (y/n/u)	N
Are there reports of adverse health effects (e.g., headaches, nausea, dizziness) potentially resulting from migration of hazardous substances through the air? (y/n/u)	N
Does analytical/circumstantial evidence suggest release to air? (y/n/u)	N
Other criteria? (y/n) N	
SUSPECTED RELEASE? (y/n)	N

Summarize the rationale for Suspected Release:

AIR PATHWAY SCORESHEETS

Pathway Characteristics

		Ref.
Do you suspect a release? (y/n)	No	
Distance to the nearest individual (feet):	0	

LIKELIHOOD OF RELEASE	Suspected Release	No Suspected Release	References
1. SUSPECTED RELEASE	0		
2. NO SUSPECTED RELEASE		500	
LR =	0	500	

Targets

TARGETS	Suspected Release	No Suspected Release	References
3. PRIMARY TARGET POPULATION 0 person(s)	0		
4. SECONDARY TARGET POPULATION	0	0	
5. NEAREST INDIVIDUAL	0	0	
6. PRIMARY SENSITIVE ENVIRONS.	0		
7. SECONDARY SENSITIVE ENVIRONS.	0	0	
8. RESOURCES	0	5	
T =	0	5	

WASTE CHARACTERISTICS

WC =	0	18

AIR PATHWAY SCORE:	1

Air Pathway Secondary Target Populations

Distance Categories	Population	References	Value
Onsite	0		0
Greater than 0 to 1/4 mile	0		0
Greater than 1/4 to 1/2 mile	0		0
Greater than 1/2 to 1 mile	0		0
Greater than 1 to 2 miles	0		0
Greater than 2 to 3 miles	0		0
Greater than 3 to 4 miles	0		0
		Total Secondary Population Value	0

Air Pathway Primary Sensitive Environments

Sensitive Environment Name	Reference	Value
None		
Total Primary Sensitive Environments Value		

*** Note : Maximum of 7 Sensitive Environments Are Printed***

Air Pathway Secondary Sensitive Environments

Sensitive Environment Name	Distance	Reference	Value
None			
Total Secondary Sensitive Environments Value			

SITE SCORE CALCULATION	SCORE
GROUND WATER PATHWAY SCORE:	1
SURFACE WATER PATHWAY SCORE:	1
SOIL EXPOSURE PATHWAY SCORE:	2
AIR PATHWAY SCORE:	1
SITE SCORE:	1

SUMMARY

1. Is there a high possibility of a threat to any nearby drinking water well(s) by migration of a hazardous substance in ground water? No

   If yes, identify the well(s).

   If yes, how many people are served by the threatened well(s)? 0

2. Is there a high possibility of a threat to any of the following by hazardous substance migration in surface water?
   A. Drinking water intake No
   B. Fishery No
   C. Sensitive environment (wetland, critical habitat, others) No

   If yes, identity the target(s).

3. Is there a high possibility of an area of surficial contamination within 200 feet of any residence, school, or daycare facility? No

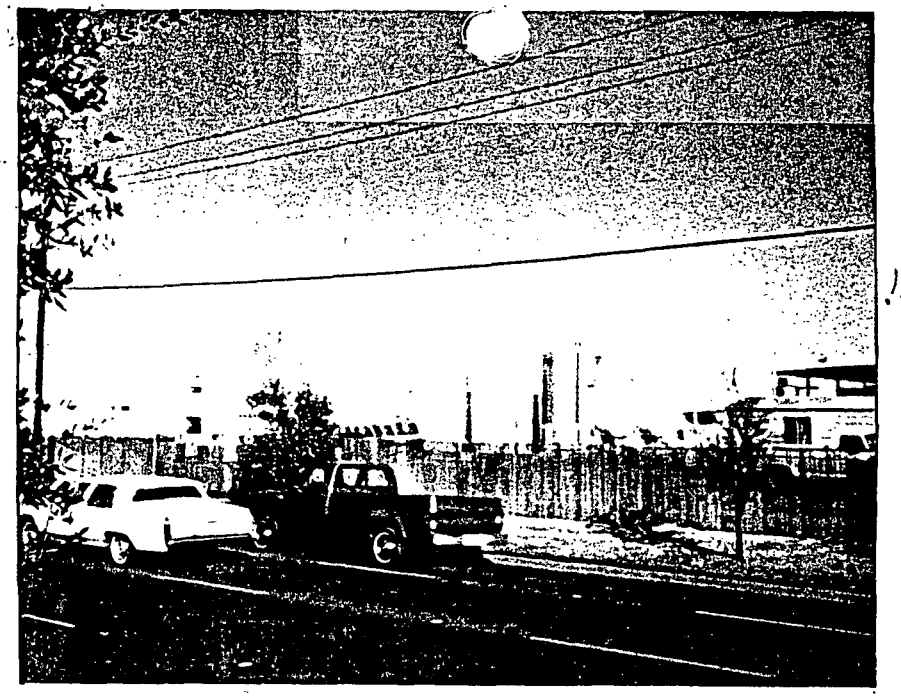
   If yes, identify the properties and estimate the associated population(s)

4. Are there public health concerns at this site that are not addressed by PA scoring considerations? No

   If yes, explain:

REFERENCE LIST

1. US EPA Potential Hazardous Waste Site, Identification and Preliminary Assessment 1/17/84



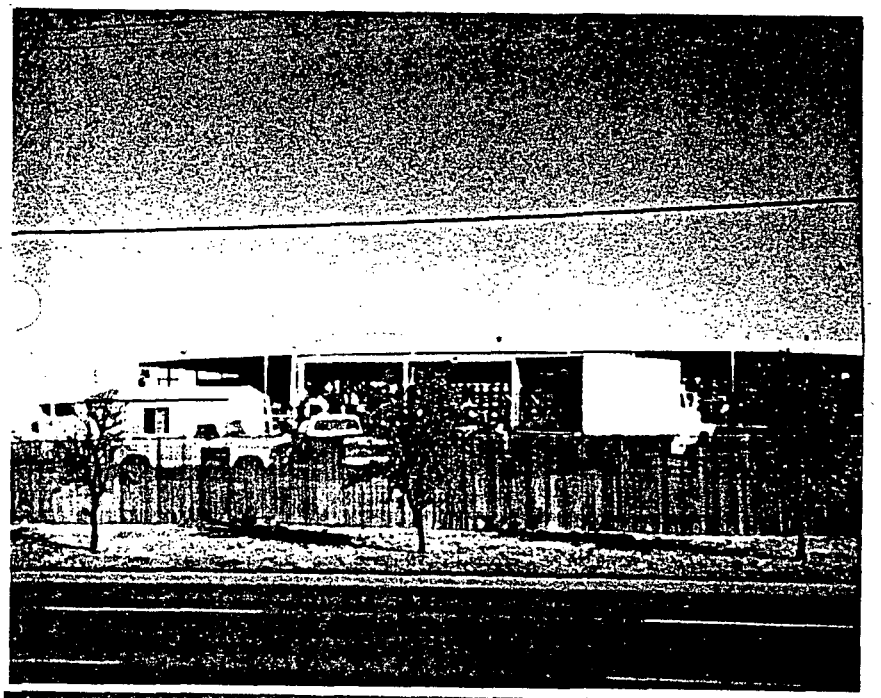
Photographer / Witness

David Wilkes

Date / Time / Direction

1/4/84 2:30 P Northeast

Comments: First frame of panorama at Van Waters and Rogers showing bulk product storage tanks.



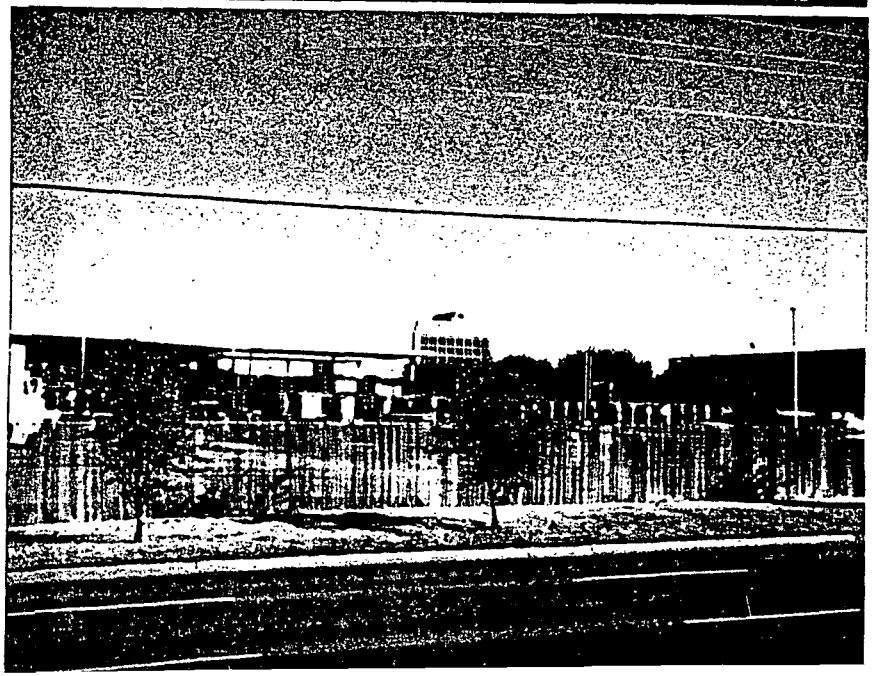
Photographer / Witness

David Wilkes

Date / Time / Direction

1/4/84 2:30 P East

Comments: Second frame of panorama showing drum storage area and warehouse.



Photographer / Witness

David Wilkes

Date / Time / Direction

1/4/84 2:30 P Southeast

Comments: Third frame of panorama showing drum storage area (product).

03:026

REFERENCE 4
"Potential Hazardous Waste Site Final
Strategy Determination. April 16 1984

RCRA 3012

EPA

POTENTIAL HAZARDOUS WASTE SITE
FINAL STRATEGY DETERMINATION

REGION	SITE NUMBER
6	TX 6203

File this form in the regional Hazardous Waste Log File and submit a copy to: U.S. Environmental Protection Agency; Site Tracking System; Hazardous Waste Enforcement Task Force (EN-335); 401 M St., SW; Washington, DC 20460.

I. SITE IDENTIFICATION

A. SITE NAME	B. STREET	
Van Waters and Rogers Co.	4707 Alpha Rd	
C. CITY	**D. STATE**	**E. ZIP CODE**
Dallas	TX	75234

II. FINAL DETERMINATION

Indicate the recommended action(s) and agency(ies) that should be involved by marking 'X' in the appropriate boxes.

RECOMMENDATION	MARK 'X'	ACTION AGENCY: EPA	STATE	LOCAL	PRIVATE
A. NO ACTION NEEDED	X				
B. REMEDIAL ACTION NEEDED, BUT NO RESOURCES AVAILABLE (If yes, complete Section III.)					
C. REMEDIAL ACTION (If yes, complete Section IV.)					
D. ENFORCEMENT ACTION (If yes, specify in Part E whether the case will be primarily managed by the EPA or the State and what type of enforcement action is anticipated.)					

E. RATIONALE FOR FINAL STRATEGY DETERMINATION

Site is a warehouse/distribution facility for various kinds of chemicals. Wastes generated are either stored (<90 days) for offsite disposal or recycled onsite. There are no inactive waste disposal facilities. Recent TDWR - RCRA compliance inspections have found the facility in compliance

F. IF A CASE DEVELOPMENT PLAN HAS BEEN PREPARED, SPECIFY THE DATE PREPARED (mo., day, & yr.).	G. IF AN ENFORCEMENT CASE HAS BEEN FILED, SPECIFY THE DATE FILED (mo., day, & yr.).
	—

H. PREPARER INFORMATION

1. NAME	2. TELEPHONE NUMBER	3. DATE (mo., day, & yr.)
A.L. GARDNER GAW-SE LDW	214/767 6421	4/16/87

III. REMEDIAL ACTIONS TO BE TAKEN WHEN RESOURCES BECOME AVAILABLE

List all remedial actions, such as excavation, removal, etc. to be taken as soon as resources become available. See instructions for a list of Key Words for each of the actions to be used in the spaces below. Provide an estimate of the approximate cost of the remedy.

A. REMEDIAL ACTION	B. ESTIMATED COST	C. REMARKS
	$	TXD042291591
	$	
	$	
	$	
	$	SUPERFUND FILE
	$	DEC 07 1992
	$	REORGANIZED
	$	
D. TOTAL ESTIMATED COST	$	

EPA Form 2070-5 (10-79)

Continue On Reverse

Continued From Front

IV. REMEDIAL ACTIONS

A. SHORT TERM/EMERGENCY ACTIONS *(On Site and Off-Site)*: List all emergency actions taken or planned to bring the site under immediate control, e.g., restrict access, provide alternate water supply, etc. See instructions for a list of Key Words for each of the actions to be used in the spaces below.

1. ACTION	2. ACTION START DATE (mo.,day.,&yr)	3. ACTION END DATE (mo.,day.,&yr)	4. ACTION AGENCY (EPA, State, Private Party)	5. COST	6. SPECIFY 311 OR OTHER ACTION INDICATE THE MAGNITUDE OF THE WORK REQUIRED.
				$	
				$	
				$	
				$	
				$	
				$	

B. LONG TERM STRATEGY *(On Site and Off-Site)*: List all long term solutions, e.g., excavation, removal, ground water monitoring wells, etc. See instructions for a list of Key Words for each of the actions to be used in the spaces below.

1. ACTION	2. ACTION START DATE (mo.,day.,&yr)	3. ACTION END DATE (mo.,day.,&yr)	4. ACTION AGENCY (EPA, State Private Party)	5. COST	6. SPECIFY 311 OR OTHER ACTION: INDICATE THE MAGNITUDE OF THE WORK REQUIRED.
				$	
				$	
				$	
				$	
				$	
				$	

C. MANHOURS AND COST BY ACTION AGENCY

1. ACTION AGENCY	2. TOTAL MAN-HOURS FOR REMEDIAL ACTIVITIES	3. TOTAL COST FOR REMEDIAL ACTIVITIES
a. EPA		$
b. STATE		$
c. PRIVATE PARTIES		$
d. OTHER (specify)		$

REFERENCE 5
Record of Communication
General site information Part 1
August 3, 1994

FLUOR DANIEL
RECORD OF TELEPHONE CONVERSATION

FROM:	Mark A. Sapyta	DATE:	8/3/94
LOCATION:	Fluor Daniel Greenville	TIME:	12:50 p.m.
TO:	Mike Herrington, Operations Manager, Univor Vanwater & Rogers	PHONE NO.:	(214) 647-0050
LOCATION:	Dallas Texas	OTHER REF:	06683422-72
SUBJECT:	Site information Part 1		

Mike said that the site was the site has been closed since either 1985 or 1986. The groundwater at the site is in the process of being cleaned up. The site is vacant except for the cleanup equipment . Mike asked me to call Carol Sanders to get the site history or any other information concerning this site. Mike did not know the site history he was not the operations manager in 1985 or 1986. Carol Sanders works in the Real Estate department for Univor Vanwater and Rogers. Her phone No. is (206) 889-3400

mas.

REFERENCE 6
Record of Communication
General site information Part 2
August 3, 1994

FLUOR DANIEL
RECORD OF TELEPHONE CONVERSATION

FROM:	Mark A. Sapyta	**DATE:**	8/3/94
LOCATION:	Fluor Daniel Greenville	**TIME:**	4:20 p.m.
TO:	John Clelden, Environmental Engineer, City of Farmer's Branch Fire Department	**PHONE NO.:**	(214) 919-2539
LOCATION:	Farmers Branch , Texas	**OTHER REF:**	06683422-72
SUBJECT:	Site information Part 2		

John Clelden said that he has extensive files on this site in his office. He allows persons to inspect or copy files. The volume of information is to much to mail me a copy of the files. John also said that Univor is voluntarily cleaning up this site. The method of treatment is pump and treat. The treated water is discharged to the Farmers Branch POTW. There is no documentation of major releases at this site. John said a slurry wall was installed around the site in 1991 or 1992.

MAS.

REFERENCE 7
Record of Communication
Water Supply to the City of Farmers Branch Part 1
August 3, 1994

FLUOR DANIEL
RECORD OF TELEPHONE CONVERSATION

FROM:	Mark A. Sapyta	**DATE:**	8 / 3 / 94
LOCATION:	Fluor Daniel Greenville	**TIME:**	5:00 p.m
TO:	Shannon Chowning, Farmer's Branch Water District, Street Superintendent	**PHONE NO.:**	(214) 247-3131
LOCATION:	Farmer's Branch, Texas	**OTHER REF:**	06683422-72
SUBJECT:	Water Supply part 1		

Shannon said that Farmer's Branch uses surface water. The source is Lake Lewisville it is located 15-20 miles north of Farmers Branch. They receive the water from the Dallas main water supply.

MAS

REFERENCE 8
Record of Communication
Water Supply to the City of Farmers Branch Part 2
August 4, 1994

FLUOR DANIEL
RECORD OF TELEPHONE CONVERSATION

FROM:	Mark A. Sapyta	**DATE:**	8 / 4 / 94
LOCATION:	Fluor Daniel Greenville	**TIME:**	4:00 p.m
TO:	Roy Smallwood, Farmer's Branch Water District, Utilities Superintendent	**PHONE NO.:**	(214) 247-3131
LOCATION:	Farmer's Branch, Texas	**OTHER REF:**	06683422-72
SUBJECT:	Water Supply part 2		

Roy said that Farmer's Branch uses the water from the Dallas main water supply. They receive the water at two locations. One location is at Beltline Rd. and Marsh Ln. (60" line) and the other is at Denton and Wicker (66" line). There are no ground water wells within 4 mile radius of the site. The city of Carrolton has one ground water well.

mad

REFERENCE 9
Record of Communication
General site information part 3
August 10, 1994

FLUOR DANIEL
RECORD OF TELEPHONE CONVERSATION

FROM:	Mark A. Sapyta	**DATE:**	8/10/94
LOCATION:	Fluor Daniel Greenville	**TIME:**	12:20 p.m.
TO:	Larry Lynch, Site Project Engineer, Univor Vanwater & Rogers	**PHONE NO.:**	(206) 889-3400
LOCATION:	Seattle, Washington	**OTHER REF:**	06683422-72
SUBJECT:	Site information Part 3		

Larry said a slurry wall was installed around the site in August of 1988. The only complaint of any release to the air was when the demolition of the tank farm caused an Ammonia release. Univor has been working with the City of Farmers Branch and the Texas water commision (TNRCC). Larry said the contamination is contained in a drainage channel that was filled in when the site was developed. He will be sending me information on the site pertaining to the waste characteristics, site history, and some information on the pathways (G.W, S.W, Soil, and Air).

mas

REFERENCE 10
Geographical Exposure Modeling System (GEMS) database
U.S. Census Bureau 1990 data
August 8, 1994

VAN WATERS
GEMS SEARCH
AUGUST 8, 1994

COVERAGE

========

STATE	COUNTY	STATE NAME	COUNTY NAME
48	85	Texas	Collin Co
48	113	Texas	Dallas Co
48	121	Texas	Denton Co

CENTER POINT AT STATE : 48 Texas

COUNTY : 113 Dallas Co

File: H:\06642400\230\77\vanw.gem

REGION OF THE COUNTRY

==========

Zipcode found: 75240 at a distance of 2.7 Km

STATE	CITY NAME	FIPSCODE	LATITUDE	LONGITUDE
TX	DALLAS	48113	32.9417	96.8017

CENSUS DATA

==========

Van Waters

LATITUDE 32:56: 0 LONGITUDE 96:49:45 1990 POPULATION

	SECTOR						
KM	0.00-.400	.400-.800	.800-1.60	1.60-3.20	3.20-4.80	4.80-6.40	TOTALS
S 1	0	0	13	8814	18597	9829	37253
S 2	0	0	7074	1968	14968	25850	49860
S 3	0	0	2259	9720	8379	15880	36238
S 4	0	0	0	8352	14269	23959	46580
RING	0	0	9346	28854	56213	75518	169931
TOTALS							

File: H:\06642400\230\77\vanw.gem

STAR STATION

==========

WBAN NUMBER	STATION NAME	LATITUDE	LONGITUDE	PERIOD OF RECORD	DISTANCE (km)
13960	DALLAS/LOVE TX	32.8500	96.8500	1967-1971	9.5
03927	FT WORTH/REGIONAL TX	32.9000	97.0333	1957-1971	19.4
13923	SHERMAN/PERRIN TX	33.7167	96.6667	1966-1976	88.3
13972	TYLER/POUNDS TX	32.3667	95.4000	1950-1954	147.8
13959	WACO TX	31.6167	97.2167	1969-1973	150.7
13966	WICHITA FALLS/MUNICIPAL ARPT	33.9667	98.4833	1985-1989	191.5
13945	FT SILL/POST OK	34.6500	98.4000	1966-1970	239.6

U.S. SOIL DATA

==========

STATE : TEXAS

LATITUDE : 32:56: 0 LONGITUDE : 96:49:45

THE STATION IS INSIDE H.U. 12030103

GROUND WATER ZONE : 7

RUNOFF SOIL TYPE : 2

EROSION : 1.1210E-03 CM/MONTH

DEPTH TO GROUND WATER BETWEEN : 9.1440E+02 AND 1.8290E+04

FIELD CAPACITY FOR TOP SOIL : 7.2000E-02

EFFECTIVE POROSITY BETWEEN : 1.0000E-02 AND 1.0000E-01

SEEPAGE TO GROUNDWATER BETWEEN : 2.7800E+02 AND 2.7800E+03 CM/MONTH

DISTANCE TO DRINKING WELL : 2.8000E+04 CM

U.S. CITY

==========

STATE	PLACE NAME	FIPSCODE	LATITUDE	LONGITUDE
TX	ADDISON	48113	32.9583	96.8300

File: H:\06642400\230\77\vanw.gem

REFERENCE 11
U.S Geological Survey 7.5-minute topographic maps
of Texas: Addison, Carrollton
1960 photo revised 1981

REFERENCE 12
"Site Characterization Report VW&R Dallas
Alpha Road Facility Farmers Branch, Texas
April 1989

REFERENCE 13
"Evaluation Of Long-Term Air Impacts
From The VW&R Air Stripper
In Farmers Branch, Texas Final Report"
August 28, 1991

REFERENCE 14
Record of Communication
General site information part 4
August 12, 1994

FLUOR DANIEL
RECORD OF TELEPHONE CONVERSATION

FROM:	Mark A. Sapyta	**DATE:**	8 / 12,26 / 94
LOCATION:	Fluor Daniel Greenville	**TIME:**	4:00 p.m
TO:	Pat Bobeck, Texas Natural Resources Conservation Commission (TNRCC), Enforcement Coordinator	**PHONE NO.:**	(512) 239-2585
LOCATION:	Austin, Texas	**OTHER REF:**	06683422-72
SUBJECT:	Site information part 4		

Pat said that Vanwaters and Rogers is working with the city of Farmers Branch and TNRCC for the cleanup of the site. Up to this point Vanwaters and Rogers were voluntarily cleaning up the site; however the "State wants to monitor the cleanup operations. The contamination is in the subsurface. Soil remediation will be required, however a method has not been determined at this time. The grounwater is being remediated by the Pump and Treat method. There is one recovery well outside of the slurry wall. *Contamination has been detected outside of the surry wall*. Vanwater and Rogers had agreed to sign a consent order to work with the State of Texas however she doesn't know if the order has been signed.

Pat appeared to be hesitent to give out information about this site
... The subject was discussed on 8/26/94

REFERENCE 15
Record of Communication
General site information part 5
August 16, 1994

FLUOR DANIEL
RECORD OF TELEPHONE CONVERSATION

FROM:	Mark A. Sapyta	**DATE:**	8/16/94
LOCATION:	Fluor Daniel Greenville	**TIME:**	1:50 p.m.
TO:	John Clelden, Environmental Engineer, City of Farmer's Branch Fire Department	**PHONE NO.:**	(214) 919-2539
LOCATION:	Farmers Branch , Texas	**OTHER REF:**	06683422-72
SUBJECT:	Site information Part 5		

John Clelden said the site is covered with concrete . The only portion of the site that is not covered is the front where the offices are. More than ninety percent of the site is concrete, less than ten percent is soil. The majority of the stormwater is collected in the storm sewers. When the site was closed the stormwater was sampled to detect any contamination. John said the stormwater is not contaminated so it goes into the storm sewer and not treated. The eastern portion of the site drains from front to back , he wasn't sure about how to characterize the western portion.

MAS

FLUOR DANIEL
RECORD OF TELEPHONE CONVERSATION

FROM:	Mark A. Sapyta	**DATE:**	8/22/94
LOCATION:	Fluor Daniel Greenville	**TIME:**	10:30 a.m.
TO:	John Clelden, Environmental Engineer, City of Farmer's Branch Fire Department	**PHONE NO.:**	(214) 919-2539
LOCATION:	Farmers Branch , Texas	**OTHER REF:**	06683422-72
SUBJECT:	Site information Part 6		

John Clelden said Vanwaters & Rogers received their discharge permit for the treated groundwater in the spring of 1990. The method of treament is air stripping the groundwater and vapor extraction in the wells.

MAS

REFERENCE 16
Record of Communication
General site information part 6
August 22, 1994

REFERENCE 17
Record of Communication
Stormwater outfall for the VW&R site
August 23, 1994

FLUOR DANIEL
RECORD OF TELEPHONE CONVERSATION

FROM:	Mark A. Sapyta	**DATE:**	8 / 23 / 94
LOCATION:	Fluor Daniel Greenville	**TIME:**	11:17 a.m
TO:	Shannon Chowning, Farmer's Branch Water District, Street Superintendent	**PHONE NO.:**	(214) 247-3131
LOCATION:	Farmer's Branch, Texas	**OTHER REF:**	06683422-72
SUBJECT:	Stormwater discharge		

Shannon said that the stormwater outfall goes to the Elm fork of the Trinity River. This outfall is 7-8 miles west of the site.

MAS

REFERENCE 18
Record of Communication
General site information part 7
August 23 & 24, 1994

FLUOR DANIEL
RECORD OF TELEPHONE CONVERSATION

FROM:	Mark A. Sapyta	**DATE:**	8/23, 24/94
LOCATION:	Fluor Daniel Greenville	**TIME:**	12:20 p.m.
TO:	Wayne Grotheer, Director of Environmental Affairs, Univor Vanwater & Rogers	**PHONE NO.:**	(206) 889-3400
LOCATION:	Seattle, Washington	**OTHER REF:**	06683422-72
SUBJECT:	Site information Part 7		

Wayne said that no workers are on the site. VW&R is finalizing a consent order with the TNRCC, order no. SWR31657. *The order covers the site through complete cleanup. *More offsite investigations will be required. Site is surrounded by a slurry wall. The grounwater treatment plant has been operational since 1991.

... Topic was discussed on 8/24/94

MAS

REFERENCE 19
Record of Communication
Wildlife near the site
August 25, 1994

FLUOR DANIEL
RECORD OF TELEPHONE CONVERSATION

FROM:	Mark A. Sapyta	**DATE:**	8 / 24/ 94
LOCATION:	Fluor Daniel Greenville	**TIME:**	5:00 p.m
TO:	Jeff Reed, U.S. Fish and Widlife Disrict	**PHONE NO.:**	(817) 889-7830
LOCATION:	Arlington, Texas	**OTHER REF:**	06683422-72
SUBJECT:	Wildlife		

Jeff said there were no Federally listed species that breed within 4 miles of the site.

MaS

RCN 206-250-05-00
DCN 91-206-250-01

EVALUATION OF LONG-TERM AIR IMPACTS FROM THE VWR AIR STRIPPER IN FARMERS BRANCH, TEXAS

Final Report

Prepared for:

Ms. Gail Clement
Senior Project Manager
Van Water & Rogers Chemical Distribution Company
4909 West Pasadena
Glendale, Arizona 85301-7620

Prepared by:

Bart Eklund
Albert Hendler
Radian Corporation
8501 Mopac Boulevard
P.O. Box 201088
Austin, Texas 78720-1088

August 28, 1991

TABLE OF CONTENTS

1.0 INTRODUCTION

Van Water & Rogers (VWR) has begun operation of an air stripping system to remove volatile organic contaminants (VOCs) from the ground water underlying a former bulk chemical storage area. The remediation system is designed to treat several gallons per minute of contaminated water, strip the VOCs from the water, and vent the emissions from a short stack. No air emission control devices are present. The site owners are potentially interested in leasing the empty building on the property. Therefore they are interested in determining the levels of emissions from the cleanup to evaluate the potential health risk, if any, via the air pathway to persons working on-site and in the surrounding commercial district. Radian Corporation, under contract to VWR, performed an air pathway assessment using a standard air dispersion model to estimate the ambient air concentrations of target compounds at the fencelines and loading dock of the facility, where potential air exposures could occur.

2.0 APPROACH

Air pathway assessments are comprised of three steps as follows:

- Determination of the emission rate of compounds of interest from the source.
- Calculation of the ambient concentrations of the emitted compounds at downwind receptor locations.
- Comparison of the ambient concentrations to health-based action levels.

The emission source term was directly determined. A one-inch port was added to the existing stack four feet below the top of the stack and EPA standard stack sampling procedures were followed. The sampling location exceeded the minimum requirements for the number of stack diameters upstream and downstream from any disturbance[1]. A velocity traverse was performed using an S-type pitot and 0-0.25 in.

magnahelic gauge to determine the total volumetric flow through the stack[2]. Once the flowrate had been measured, an eighteen inch long, one-quarter inch inner diameter, stainless-steel probe was inserted in the stack. The final six inches of the probe had twelve equally spaced sample entry ports. A 2.8 L Summa-polished canister fitted with a 7-micron filter and a precision air flow regulator was attached to the probe. The flow regulator was set to collect an integrated air sample over a one hour period. Three sets of stack measurements were performed on May 13, 1991. Runs #1 and #2 were at typical operating conditions; run #3 was at the maximum water treatment rate. The air stripping system was allowed to equilibrate for two hours after the water treatment rate was reset and before run #3 was started.

The canister samples were analyzed using a gas chromatograph equipped with multiple detectors (GC-MD). The samples were first concentrated using a cryogenic trap. The samples were then thermally desorbed onto a capillary column. The flow was split from the capillary column into a flame ionization detector (FID) and a photoionization detector (PID) to provide quantitative and qualitative data. A Hall electrolytic conductivity detector (HECD) was used to detect halogenated compounds. Species concentrations were calculated using a computerized data acquisition system with toluene normalized response factors.

3.0 RESULTS

The measured concentrations of the exit gas from the air stripper stack are given in Table 1. Approximately fifty compounds were present in each sample. The ten compounds on the target analyte list were identified and quantified along with the five largest other peaks (i.e. top 5 compounds). Unidentified volatile organic compounds (VOCs) and total non-methane hydrocarbons (TNMHC) were determined by assuming an average molecular weight of hexane (86.18 g/g-mole). Benzene and vinyl chloride are the only known human carcinogens (EPA Class A carcinogens) on the target analyte list.

Table 1.

Analytical Results for Stack Gas Samples

Compound	Run #1 (ppm-v)	Run #2 (ppm-v)	Run #3 (ppm-v)
Target Analytes			
Vinyl Chloride	1.10	1.88	0.798
1,1-Dichloroethylene	ND	ND	ND
Methylene Chloride	1.49	2.27	1.57
1,1-Dichloroethane	ND	ND	ND
1,2-Dichloroethane	12.0	12.6	12.3
Benzene	0.495	0.445	0.736
Trichloroethylene	6.53	6.84	6.20
Tetrachloroethylene	0.103	0.213	0.132
1,1,2,2-Tetrachloroethane	ND	ND	ND
p-Dichlorobenzene	ND	ND	ND
Top Five Compounds			
Toluene	6.58	5.28	5.96
Acetone	12.0	--	6.67
Freon 113	13.3	13.8	14.0
Acetaldehyde	6.45	9.97	15.0
Ethanol	--	7.21	--
Ethane	--	5.41	--
Unidentified VOC	2.90	--	2.75
Total Non-Methane Hydrocarbons (TNMHC)	59.6	42.8	64.6

NOTES:

1. ND = Not Detected. Detection limit is nominally 0.001 ppm-v.
2. TNMHC = Assumes average molecular weight of hexane.
3. Run #3 was at maximum water treatment rate.

All of the other target analytes are probable or possible human carcinogens (EPA Class B or C carcinogens). The target analytes were selected from the list of compounds previously identified in the site groundwater based on their relative water-phase concentration and their toxicity. The identity of the unidentified compounds in runs #1 and #3 are most likely isohexane and methanol; neither compound is significant from a risk standpoint.

The stack conditions on the day of sampling were as follows:

Stack height:	17.5 ft.
Stack diameter:	6 in. (0.5 ft.)
Exit gas velocity:	17.8 ft/sec
Exit gas flowrate:	3.32 ft^3/sec (dscf), 0.094 m^3/sec (dscm)
Exit gas temperature:	2-3°F below ambient

The exhaust gas was assumed to have the same molecular weight as ambient air and to be saturated with respect to water vapor (3.3%). The gas velocity and flowrate data are for a dry gas at standard temperature and pressure (528°R and 29.92 in. Hg).

Emission rates were calculated as follows. The measured concentrations were converted from ppb-v to ug/m^3 by:

$$ug/m^3 = ppm\text{-}v * \frac{0.001\ ppb\text{-}v}{ppm\text{-}v} * MW_i * \frac{1}{24.46} \qquad \text{(Eq. 1)}$$

where: MW_i = Molecular weight of compound i (g/g-mole).

The concentration was then multiplied by the exit gas flowrate (in m^3/sec) to calculate emission rates for input to the dispersion model. For each target compound, an emission rate in milligrams per second is shown in Table 2. The emission rates can be divided by a factor of 126 to convert to pounds per hour.

Table 2.

Emission Rates of Selected Stack Compounds from Air Stripper Stack

Compound	Run #1 (mg/sec)	Run #2 (mg/sec)	Run #3 (mg/sec)
Target Analytes			
Vinyl Chloride	0.26	0.45	0.19
1,1-Dichloroethylene	ND	ND	ND
Methylene Chloride	0.49	0.74	0.51
1,1-Dichloroethane	ND	ND	ND
1,2-Dichloroethane	4.6	4.8	4.7
Benzene	0.15	0.13	0.22
Trichloroethylene	3.3	3.4	3.1
Tetrachloroethylene	0.066	0.14	0.084
1,1,2,2-Tetrachloroethane	ND	ND	ND
p-Dichlorobenzene	ND	ND	ND
Top Five Compounds			
Toluene	2.3	1.9	2.1
Acetone	2.7	--	1.5
Freon 113	9.6	9.9	10.1
Acetaldehyde	1.1	1.7	2.5
Ethanol	--	1.3	--
Ethane	--	0.62	--
Unidentified VOC	0.96	--	0.91
Total Non-Methane Hydrocarbons (TNMHC)	19.7	14.2	21.4

NOTES:

1. ND = Not Detected. Detection limit is nominally 0.001 ppm-v.
2. TNMHC = Assumes average molecular weight of hexane.
3. Run #3 was at maximum water treatment rate.

Dispersion modeling in support of air pathway assessments is relatively straight-forward. Radian followed the five step methodology developed by EPA:

Step 1: Obtain Source Characterization Information;
Step 2: Select Release Constituents;
Step 3: Calculate Emission Estimates;
Step 4: Calculate Concentration Estimates; and
Step 5: Compare Concentration results to Health-Based Criteria.

Steps 1 through 3 were met by the source sampling described above. The long-term version of the Industrial Source Complex (ISC) model[3] was used along with 13 years of representative historical meteorological data for the Dallas area[4] to generate annual average concentrations at the property fenceline. Downwash from the air stripper building and the two adjacent holding tanks was taken into account. The results of the long-term modeling are summarized in Table 3. The values in Table 3 are conversion (dilution) factors; they yield the concentration (in ug/m^3) per a unit emission rate (1 mg/sec). Concentration isopleths are shown in Figure 1. These allow calculation of concentrations at any location within 100m of the air stripper.

An average emission rate for each compound of interest was calculated by averaging the results of the three sampling runs. The third run was conducted at the maximum treatment rate for the system, but the emission rates did not differ significantly from the two sampling runs at typical treatment rates. For the top 5 compounds, the average was based on those peaks that were present and quantified. These average emission rates were then used along with the conversion factors presented in Table 3 to estimate annual average concentrations at selected receptor locations. These are shown in Table 4 and compared to health-based risk levels from the Texas Air Control Board (TACB)[5].

Table 3.

Summary of Results for Long-Term Air Dispersion Modeling

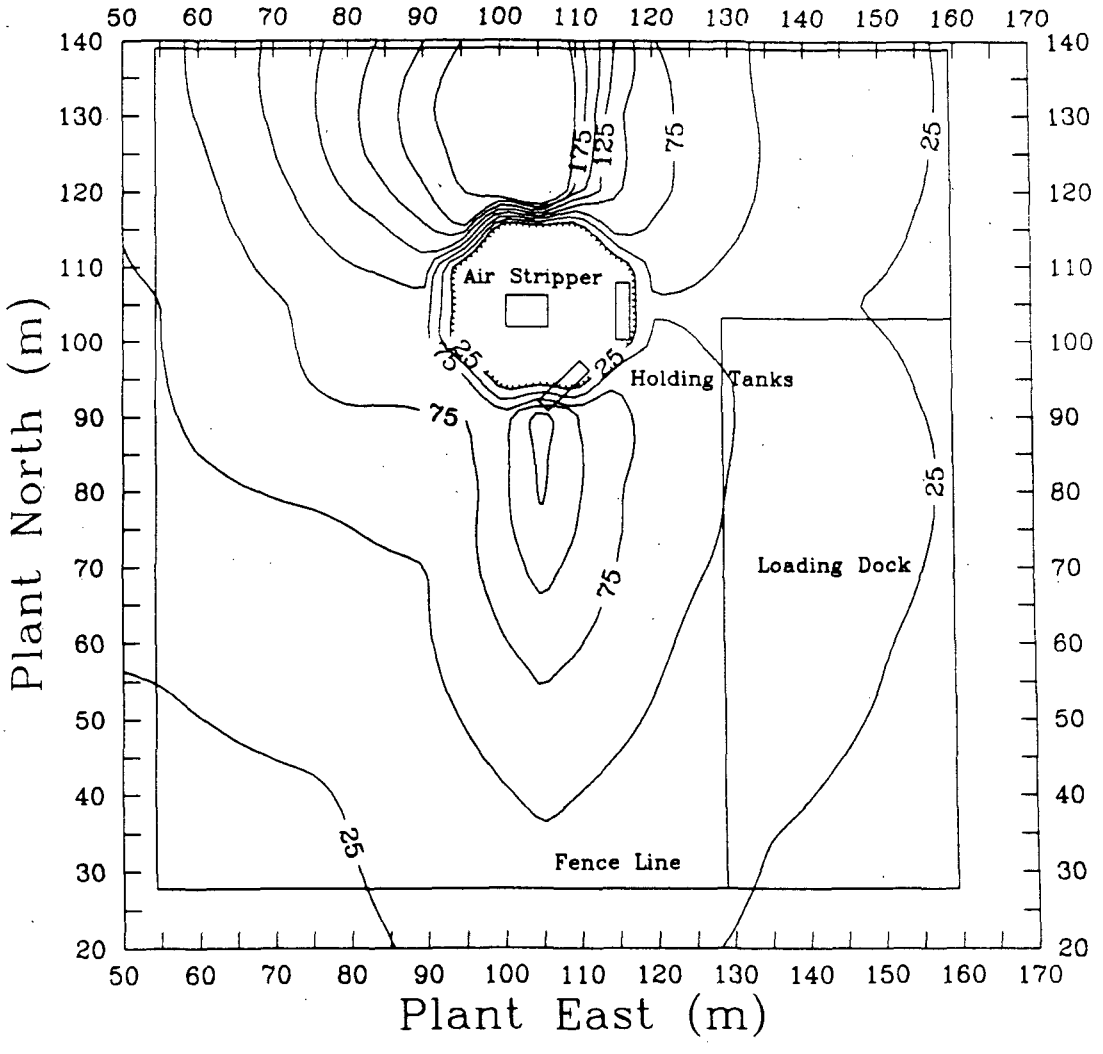
Location	Conversion Factor ($\mu g/m^3$ per mg/sec)
Loading Dock	0.0573
North Fenceline	0.251
West Fenceline	0.0787
South Fenceline	0.0436
Maximum Concentration	0.314

NOTES:

1. The conversion factor is multiplied by the emission rate (in mg/sec) for a given compound to yield the concentration of that compound (in $\mu g/m^3$) at the specified location.

2. The maximum average annual concentration is 49 feet north of the stack.

CONVERSION FACTORS



NOTES:

1. Contours (in intervals of 25) are conversion factors in $\mu g/m^3$ based on an emission rate of a g/sec making the units:

$$\frac{\mu g/m^3}{g/sec}$$

2. Divide the values in the figure by 1,000 to make them the same as conversion factors in Table 3.

To obtain the concentration of a specific compound in $\mu g/m^3$ at a given location, look up the conversion factor from the above figure. Divide the average emission rate listed in Table 4 for that compound by 1,000 to convert from mg/sec to g/sec. Then multiply the conversion factor by the g/sec emission rate.

Figure 1. Results of Long-Term Air Dispersion Modeling.

Table 4.

Comparison of Ambient Concentrations to Risk-Based Action Levels

Compound	Average Emission Rate (mg/sec)	Average Annual Concentration ($\mu g/m^3$)					TACB ESL ($\mu g/m^3$)	
		Loading Dock	North Fence	West Fence	South Fence	Maximum Conc.[3]	30-minute	Annual
Vinyl Chloride	0.30	0.017	0.075	0.024	0.013	0.094	100	10
1,1-Dichloroethylene	0	0	0	0	0	0	None	None
Methylene Chloride	0.58	0.033	0.146	0.06	0.025	0.182	260	26
1,1-Dichloroethane	0	0	0	0	0	0	4000	400
1,2-Dichloroethane	4.7	0.269	1.180	0.370	0.205	1.476	40	4
Benzene	0.17	0.010	0.043	0.013	0.007	0.053	30	3
Trichloroethylene	3.3	0.189	0.828	0.267	0.144	1.036	1650	135
Tetrachloroethylene	0.097	0.006	0.025	0.008	0.004	0.030	335	33.5
1,1,2,2-Tetrachloroethane	0	0	0	0	0	0	70	7
p-Dichlorobenzene	0	0	0	0	0	0	1080[1]	450
Toluene	2.1	0.120	0.527	0.165	0.092	0.659	3750	375
Acetone	2.1	0.120	0.527	0.165	0.092	0.659	5900	590
Freon 113	9.9	0.567	2.485	0.779	0.432	3.109	76000	7600
Acetaldehyde	1.8	0.103	0.452	0.142	0.078	0.565	90	90[2]
Ethanol	1.3	0.074	0.326	0.102	0.057	0.408	19000	1900
Ethane	0.62	0.036	0.156	0.049	0.027	0.195	None	None
Total Non-Methane Hydrocarbon (TNMHC)	18.4	1.054	4.618	1.448	0.802	5.778	None	None

NOTES:

1. Based on odor threshold.
2. Annual ESL exceeds 30-minute ESL.
3. The point at which maximum ground-level concentrations are predicted to occur (49 feet north of the stack and within the property fenceline).

The long-term (annual) risk levels from TACB are applicable for comparison to the modeling results; short-term risk levels are also shown. The TACB levels shown are Effects Screening Levels, or ESLs. The short-term ESLs are for 30 minute periods and the long-term ESLs are for annual periods. The TACB ESLs are not regulatory standards, but are guidelines used by the Texas Air Control Board for assessing modeling results and ambient air data. Predicted values that fall below the ESLs indicate that no action is required; exceedances of the ESLs are treated on a case-by-case basis by the TACB. The ESLs are generally based on short-term occupational exposure limits established by Occupational Health and Safety Administration (OSHA) or the American Conference of Governmental industrial Hygienists (ACGIH). TACB typically divides these values by 100 to derive 30-minute ESLs and by 1,000 to derive annual ESLs. The division by a factor of 100 is to account for sensitive receptors in the general population such as children and persons with asthma. The further division by a factor of 10 to derive an annual ESL is to account for the fraction of time a given location is expected to be downwind of a given emission source.

4.0 DISCUSSION OF RESULTS

The stack sampling results for all three runs show equivalent results. As is typical, there is more variability in the concentration data for the oxygenated, polar compounds such as acetone and ethanol. The results indicate that the adjustment of the water treatment rate did not result in significantly higher air emissions.

There is considerable uncertainty in health-based action levels, including ESLs. The short-term occupational exposure limits on which the ESLs are based undergo annual review and are subject to change as new data become available. No ESLs exist at this time for certain compounds (e.g., 1,1-Dichloroethylene).

The long-term modeling indicates that the ambient concentrations of all compounds are well below the TACB annual effects screening levels at all locations at the site, including the point of maximum concentration. The analysis indicates that no adverse impacts via the air pathway of exposure are to be expected.

5.0 REFERENCES

1. Code of Federal Regulations, Volume 45, Number 9, Appendix A, Method 1 January 1980.

2. Code of Federal Regulations, Volume 45, Number 9, Appendix A, Method 2 January 1980.

3. U.S. EPA. Guidelines on Air Quality Models (Revised). EPA-405/2-78-072R. NTIS PB 86-245248. July 1986.

4. National Climatic Data Center. Statistical Array (STAR) Data Base for 1961 to 1973 for Dallas, Texas.

5. Texas Air Control Board. Update of Effects Screening Level List - Memorandum From Effects Evaluation Staff. August 8, 1989.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CARROLLTON QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)

UNITED STATES
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ADDISON QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)
NE/4 CARROLLTON 15 QUADRANGLE

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Topography by photogrammetric methods from aerial photographs taken 1956. Field checked 1959

Polyconic projection. 10,000-foot grid ticks based on Texas coordinate system, north central zone. 1000-meter Universal Transverse Mercator grid ticks, zone 14, shown in blue. 1927 North American Datum. To place on the predicted North American Datum 1983 move the projection lines 10 meters south and 27 meters east as shown by dashed corner ticks

Red tint indicates areas in which only landmark buildings are shown

Revisions shown in purple and woodland compiled from aerial photographs taken 1978 and other sources. This information not field checked. Map edited 1981

Purple tint indicates extension of urban areas

CONTOUR INTERVAL 10 FEET
DOTTED LINES REPRESENT 5 FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

SCALE 1:24000

UTM GRID AND 1981 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

ROAD CLASSIFICATION

Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
Interstate Route — U.S. Route — State Route

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1959
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